

IDAHO

DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

FEDERAL AID IN FISH RESTORATION
Job Performance Report
Project F-71-R-16



REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

Job No. 3-a.	Region 3 (McCall) Mountain Lakes Investigations
Job No. 3-b ¹ .	Region 3 (McCall) Lowland Lakes and Reservoirs Investigations
Job No. 3-b ² .	Region 3 (McCall) Lowland Lakes and Reservoirs Investigations - Cascade Reservoir Creel Census and Fish Investigations
Job No. 3-c.	Region 3 (McCall) Rivers and Streams Investigations
Job No. 3-d.	Region 3 (McCall) Technical Guidance
Job No. 3-e.	Region 3 (McCall) Salmon and Steelhead Investigations

By

Paul J. Janssen, Regional Fishery Biologist
Donald R. Anderson, Regional Fishery Manager

January 1994

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JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fisheries Management
Investigations

Project: F-71-R-16

Title: Region 3 (McCall) Mountain
Lakes Investigations

Job No.: 3-a (McCall)

Period Covered: July 1, 1991 - June 30, 1992

ABSTRACT

Disappointment Lake contained a large population of small brook trout Salvelinus fontinalis. Because the quality of fishing was less than could be expected, the decision was made to remove the brook trout from the lake and restock with bull trout S. confluentus. The lake was rotenoned in September 1991. Copies of the required permit and the final report are presented in this report in Appendix A.

Since 1987, several lakes have been stocked with brown trout Salmo trutta in an attempt to control stunted brook trout and/or to provide a diversity in fishing opportunity (Janssen and Anderson, 1992). Deep and Trail lakes were sampled in 1991 with gill nets and hook-and-line to monitor the effects of brown trout stocked in brook trout waters.

A total of 32 brook trout were sampled in Trail Lake, and 2 brook trout and 4 brown trout were sampled in Deep Lake. Brook trout in Trail Lake averaged 217 mm in length, which was an increase of only 18 mm from 1990.

Trout numbers in Deep Lake appear to have dropped dramatically since 1990. Only 1 brook trout and 4 brown trout were sampled in the gill nets in 1991, compared to 45 brook trout and 7 brown trout in 1990.

Author:

Paul J. Janssen
Regional Fishery Biologist

OBJECTIVES

1. To evaluate fisheries management techniques in alpine lakes.
2. To identify problems and/or opportunities in lakes that currently are not being directly managed.

INTRODUCTION

Since 1987, brown trout Salmo trutta have been stocked in alpine lakes to provide a diversity in fishing opportunity and/or to find out if these fish can control stunted brook trout Salvelinus fontinalis populations that exist in many of the lakes. Reports by Scully and Anderson (1988, 1989), Grunder and Anderson (1990, 1990), and Janssen and Anderson (1992) describe early results of the first stockings, the stocking of additional waters, and the supplemental stockings of some of the initial stocking sites with more and/or larger fish. Deep Lake and Trail Lake trout populations were examined in 1991 to help evaluate the program.

METHODS

Deep and Trail lakes were each sampled with one 150-ft standard experimental gill net fished overnight. Hook-and-line gear was also utilized. All fish collected were measured for total length.

RESULTS

A total of 32 brook trout were sampled in Trail Lake, and 2 brook trout and 4 brown trout were sampled in Deep Lake. Brook trout in Trail Lake averaged 217 mm in length, which was an increase of only 18 mm from 1990. There were seven brook trout collected with hook-and-line gear. These fish averaged 259 mm, 151 g, with a condition factor of 0.82. As expected, these fish were larger due to the selective nature of hook-and-line gear for larger fish.

Trout numbers in Deep Lake appear to have dropped dramatically since 1990. Only 1 brook trout and 4 brown trout were sampled in the gill nets in 1991, compared to 45 brook trout and 7 brown trout collected in 1990. The brown trout averaged 270 mm, a decrease of 5 mm from 1990. The one brook trout collected in gill nets was 241 mm.

DISCUSSION

From this limited sampling, it appears that the brown trout plants are having little effect on brook trout populations. An extensive evaluation of all the mountain lake experimental brown trout stockings is needed in 1992. Most of the plants have had ample time (up to 4 years) to work as intended.

RECOMMENDATIONS

1. Gill net all mountain lakes in 1992 that have received brown trout as part of the stunted brook trout control study.
2. Make final evaluation of the brown trout stocking program in 1992.
3. Gill net Disappointment Lake to verify treatment success.
4. Stock bull trout S. confluentus in Disappointment Lake in 1992.

LITERATURE CITED

- Grunder, S.A., J.D. Linman, and D.R. Anderson. 1990a. Federal Aid in Fish Restoration. Regional Fisheries Management Investigations, Job Performance Report, Project F-71-R-13. Idaho Department of Fish and Game, Boise.
- Grunder, S.A., J.D. Linman, and D.R. Anderson. 1990b. Federal Aid in Fish Restoration. Regional Fisheries Management Investigations, Job Performance Report, Project F-71-R-14. Idaho Department of Fish and Game, Boise.
- Scully, R., and D.R. Anderson. 1988. Federal Aid in Fish Restoration. Regional Fisheries Management Investigations. Job Performance Report. Project F-71-R-11. Idaho Department of Fish and Game, Boise.
- Scully, R., and D.R. Anderson. 1989. Federal Aid in Fish Restoration. Regional Fisheries Management Investigations. Job Performance Report. Project F-71-R-12. Idaho Department of Fish and Game, Boise.

A P P E N D I C E S

Appendix A. Copies of the required permits and the final report for the
Disappointment Lake rotenone treatment project, September 1991.

APPUCATION FOR SHORT-TERM ACTIVITY EXEMPTION

Applicant: Idaho Department of Fish and Game (IDFG) and Payette National Forest (PNF)

Contact Person: Don Anderson, 634-8137; John Lund, 634-0619

Body of Water: Disappointment Lake and outlet stream downstream to Hazard Creek (see map)

Tributary To: Hazard Creek - Little Salmon River

Objective: To chemically eradicate stunted brook trout using rotenone and replace with golden trout or cutthroat trout

Date: September 27, 1991

Evidence of protection or promotion of public interest

Beginning in 1983 the IDFG heard from the public and PNF that the brook trout in the Grass Mountain Lakes (aka Grassy Twins) and Disappointment Lake were stunted and not of interest to anglers. In 1984 the IDFG obtained baseline data on the population and introduced fall chinook salmon to act as a predatory control on the population. We also planted fall chinook salmon in 1986. By 1988 the fall chinook were absent in the lakes and the brook trout population was unchanged. The fall chinook apparently could not compete with the over-population of brook trout and did not grow to predatory size.

The IDFG, using a PNF furnished helicopter, has recently planted catchable-size brown trout in seven other alpine lakes with stunted brook trout in an attempt to control the brook trout through predation. These attempts are still under evaluation, but preliminarily show some promise for success. We cannot, however, use brown trout in the Salmon River drainage by IDFG policy decision.

In 1989, the IDFG and PNF decided to attempt chemical control on the Grass Mountain lakes. The PNF completed NEPA documentation of the proposed activity, including publishing a description of the proposed eradication. They requested public input. The IDFG presented the proposal to the McCall Chapter of Trout Unlimited and solicited input from the general public, anglers at the trailhead to the Grass Mountain lakes, and known alpine lakes anglers. Of about 25 personal contacts and telephone comments, 5 were opposed to the project and 20 in favor.

In late October 1990, the IDFG and PNF received several comments from the public opposing the eradication project on the Grass Mtn. lakes. The major objections from 28 respondents were that these lakes provide high catch rates and are easily accessed (see attachments 1 & 2). The IDFG and PNF elected to cancel the project on the Grass Mtn. lakes and planned a treatment of Disappointment Lake.

Appendix A. Continued.

Disappointment Lake is similar to the Grass Mtn. lakes both physically and biologically, but access is considerably more difficult. Fish sampling in 1984 and 1985 indicated the Disappointment Lake brook trout population was more effected by over-population than the Grass Mtn. lakes (see Appendix). Existing baseline data on all 3 lakes will allow evaluation of the use of chemical rehabilitation as a management tool for alpine lakes.

About 40 alpine lakes in the McCall area are considered to have stunted brook trout populations. Most anglers would prefer larger, more healthy fish. If this method of control proves successful we could improve the fishing in some of these identified lakes. Some brook trout lakes will be managed for over-populations and that specific type of fishing experience.

Prevention of long-term Injury of beneficial use

We plan to stock either golden trout or cutthroat trout back into Disappointment Lake next summer after the zooplankton populations re-establish. We expect the lake to be toxic 3-5 weeks and zooplankton established 4 weeks after ice-off.

We conducted an *in situ* serial dilution bioassay in lower Grass Mtn. Lake in September 1990. Dilutions of 0.5, 0.4, 0.3, 0.2, 0.1 and 0.0 ppm of Roussel Biocorp Nu-Syn Noxfish were tested.

Grass Mtn. Lake Bioassay

Time	Rotenone Concentration					No rotenone
	.5 ppm	.4 ppm	.3 ppm	.2 ppm	.1 ppm	
1:30	rotenone	added	-----	-----	-----	-----
2:00	all dead	1 dead	0 dead	0 dead	0 dead	0 dead
2:30	all dead	all dead	0 dead	0 dead	0 dead	0 dead
3:00	all dead	all dead	all dead	2 dead	0 dead	0 dead
3:30	all dead	all dead	all dead	all dead	1 dead	0 dead
4:00	all dead	all dead	all dead	all dead	2 dead	0 dead
4:30	all dead	all dead	all dead	all dead	2 dead	0 dead
5:00	all dead	all dead	all dead	all dead	all dead	0 dead
# fish in bag	3 fish	2 fish	3 fish	3 fish	3 fish	3 fish

Water temperature: 58° surface & bottom, inlet 54°

Weather: Cool & rainy

Location: Lower Grass Mtn. Lake

Specimen Size: Average 7" except one 9" and one 4".

Because the lakes are very similar in parent geology, elevation, size, shape and other physical parameters we believe it is appropriate to use the bioassay results for Disappointment Lake (Attachment 3). We have elected to treat at 0.25 ppm, 1/2 the manufacturer's recommended minimum concentration.

IDFG and PNF personnel calculated lake volume in June 1990. Depth sounding were taken from a boat and used to draw a bathymetric map based on a USGS topographic map (Attachment 4). We calculated the area of each stratum using a grid system (graph paper), where each square had a known area. The number of squares .as multiplied by the area of each square.

To verify the scale on the topographic map, PNF personnel measured a length of road visible on the same aerial photo. Additionally, PNF personnel measured the surface area using a planimeter. We obtained area estimates of 18.4 and 14.1 surface acres. We elected to use the smaller surface estimate for calculating volumes by depth strata.

We calculated surface area of each depth contour and used the following equation to determine volume between each contour level. Attachment 5.

$$V_s = \frac{h}{3} (A_1 + A_2 + \sqrt{(A_1)(A_2)})$$

h = height or stratum

A₁ = area of upper surface

A₂ = area of lower surface

From (Fisheries
Techniques - Nielsen &

Johnson, 1983). We determined the volume to be 186 acre feet.

Rotenone necessary for 0.25 pp - 1 gal/12 acre feet - 15.5 gals.

Flow measurements were done on August 19 and August 26, 1991 at 7 locations (attachment 6). We expect flows at all locations to decrease by the treatment date: sites 1 & 2 should decrease more than 5, 6 and 7. We will measure flows at 1 & 2 and at 5, 6, & 7 within 7 days of the treatment to obtain actual flows prior to the treatment.

Using the August flaws, the 0.25 ppm concentration of rotenone discharging from Disappointment Lake at 2.2 cfs (site 1) would be diluted to no more than 0.015 ppm by the 36 cfs in Hazard Creek (site 3). This is well below any recorded toxic levels. Natural decomposition of the chemical will be enhanced by the increased exposure to atmospheric oxygen in the extremely steep out-flowing stream characterized by cascades and numerous waterfalls.

Approximately 12 gallons of Roussel Biocorp Nu-Syn Noxfish will be mixed with 100 gallons of water in the tank of a standard, agricultural crop duster system on a Hiller 12E helicopter. The helicopter will make passes over the lake, spraying the chemical which turns cloudy white upon contact with the water. Even distribution will be accomplished with this low volume, "self marking" application method by avoiding overlap and creating "hot spots."

Approximately 3.5 gallons will be applied by IDFG and PNF personnel at the lake using bladder bags to treat inlets and seeps around the perimeter of the lake.

About 31 acre feet of water is deeper than 15 m (probable thermocline). The rotenone is reported to penetrate the thermocline, but there is concern that it won't. IF it doesn't, the amount of rotenone in the epilimnion would increase by 2.58 gallons or 20 percent, still within a conservative application rate.



UCL 10 100

Jean Odmark

Box 238
McCall, Idaho 83638
Office: (208) 636-7377
Res: (208) 636-5758

10/15/90

Mr. Don Anderson
Dept. of Fish and Game
McCall, ID 83638

Dear Mr. Anderson,

My purpose in writing this letter is to, hopefully, dissuade you from recommending the poisoning of the Grassy Twin Lakes. Please consider the following reasons:

1. Access to Grassy Twins is an easy 45 minute walk that is perfect for the "out-of-shape" weekender from lower elevation, or a bunch of kids or more importantly—the older crowd that wants to experience a hike into the woods and have a fun fishing trip.
2. Instead of killing all the existing fish, why not increase the limit people can catch or else just restrict the spawning so that there won't be so many fingerlings? .
3. These lakes are fun to fish because the non experience/fisherman can have a "success experience" plus the enjoyment of being able to camp out and eat a bunch of fish that taste a whole lot better than the larger fish in other lakes.

I personally use this lake for myself and recommend it to a lot of out-of-town friends who would be intimidated by taking a hike into a more remote mountain lake. They have always been thrilled by the experience they have at this easily accessible - good fishing lake. If you want to experiment on killing fish, please pick a much more remote non-used lake.

Regards,

Jean Odmark
Jean Odmark

cc: John Lund

Appendix A. Continued.

WE THE UNDERSIGNED, ASK THAT GRASSY TWIN LAKES NOT BE POISONED SO THAT THE LAKES
MAY BE RESTOCKED WITH ANOTHER FISH.

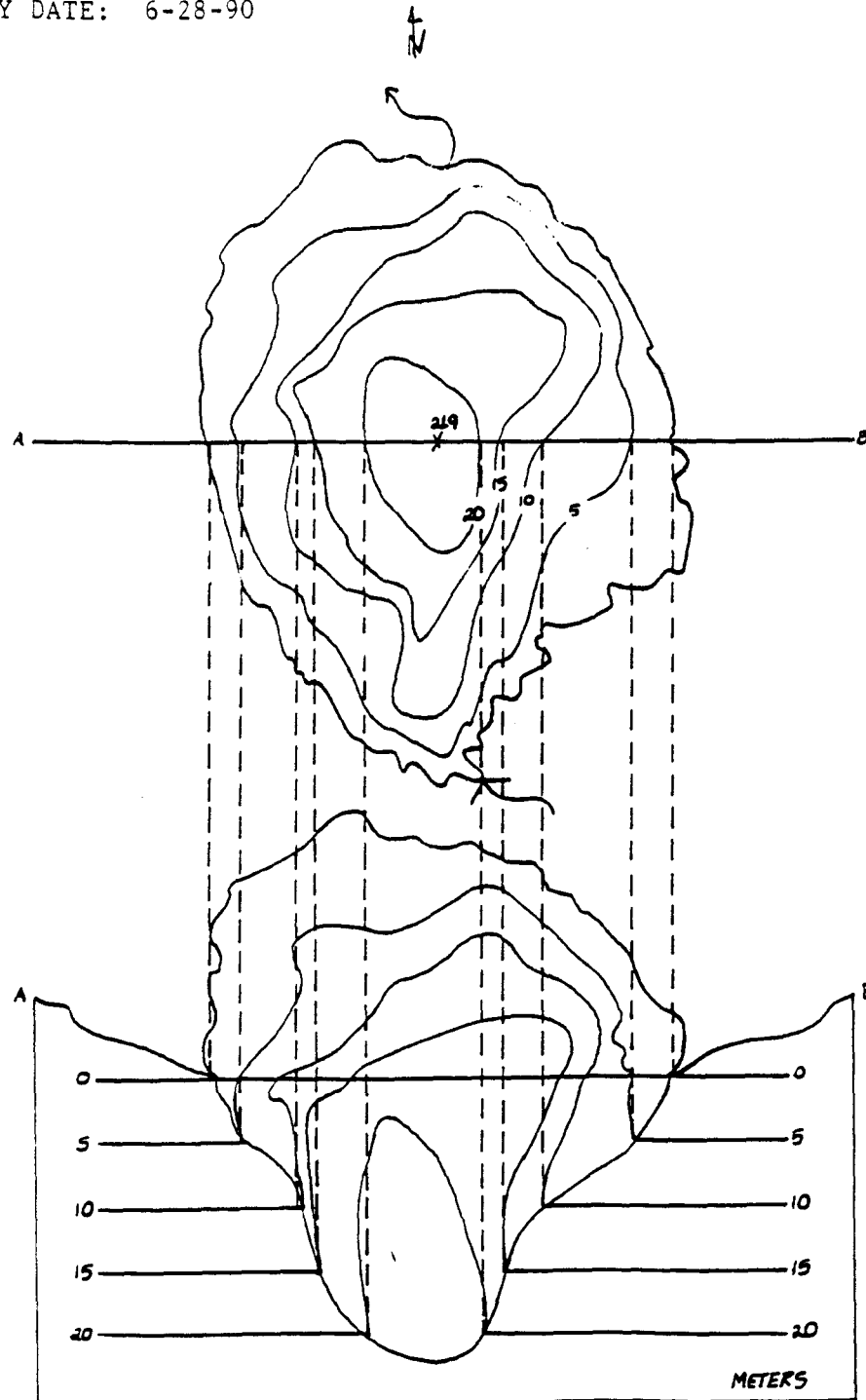
WE ENJOY FISHING THE EXISTING BROOKIES THAT NOW INHABIT THE LAKE.

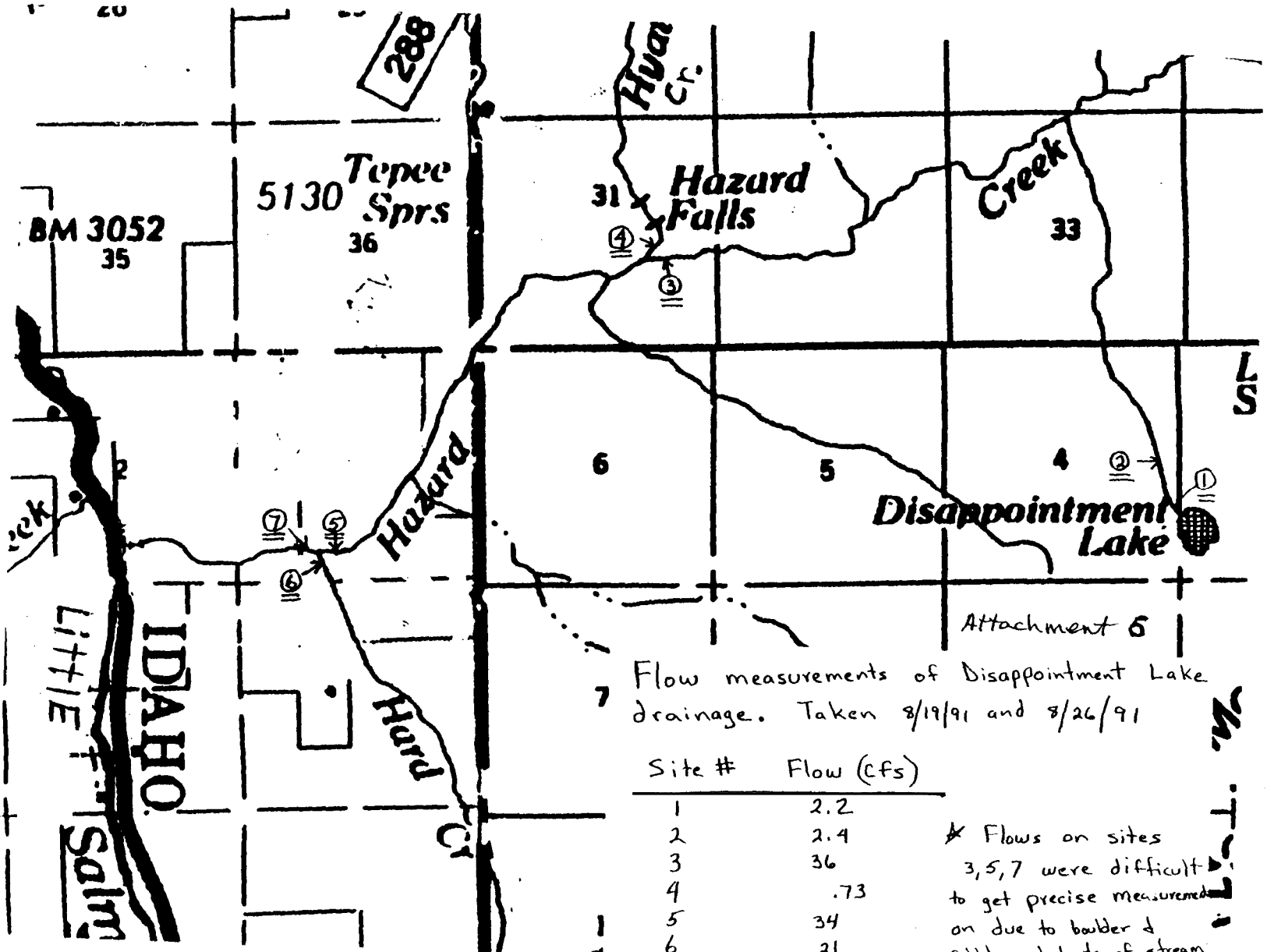
	Phone	
12411E		
Barbara Fyfe	634-2491	
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Sam Biscoe	634-4737	
Louise Newcomb	634-7201	
John	634-8328	
Choutner	634-8328	
Lois Fry	634-7288	
Kathy Allen	634-7676	
Kathy Trachten	634-2532	
Barbara Allen	634-2532	
John Ryle	634-3491	
Joni Blaudain	362-5662	
Craig Brock	343-5506	
Don Beaudoin	362-5662	
Doreen Guenther	384-0943	
David Storvar	883-1120	Moscow
ANN Storvar		

Appendix A. Continued.

SURFACE AREA: 18.4a/7.4ha
LENGTH: 1000'
WIDTH: 800'
MAXIMUM DEPTH: 71.8'/21.9m
SURVEY DATE: 6-28-90

ELEVATION: 6863'/2092m
BANK FULL HEIGHT: 1' high
CONTOUR INTERVAL: 5m
USGS TOPOGRAPHICAL MAP: HAZARD LAKE





Appendix A. Continued.

DECISION MEMO
CATEGORICAL EXCLUSION
LOST VALLE' RESERVOIR AND DISAPPOINTMENT LAKE REHABILITATION

NEW MEADOWS RANGER DISTRICT
PAYETT NATIONAL FOREST

PURPOSE AND NEED FOR ACTION

This decision allows the New Meadows Ranger District to implement a cooperative rehabilitation effort on Lost Valley Reservoir and Disappointment Lake with the Idaho Department of Fish and Game. The purpose of the projects is to remove undesirable fish from each of these water bodies. Lost Valley Reservoir has an over abundance of stunted yellow perch and Disappointment Lake has stunted brook trout. Rotenone, a fish toxicant will be applied aerially and with drip stations. Each will then be restocked with a more desirable fish species.

Scoping Summary:

Scoping letters were mailed to Idaho Department of Health and Welfare Division of Environmental Quality, U.S. Fish and Wildlife Service, and about thirty interested individuals. An article describing the project was published in the Star News, the Council Record, and the Weiser Signal-American. Originally, Grassy Twin Lakes were being considered for the high mountain Lake treatment in 1990. However, concern expressed by lake users in changing the fishing opportunity for such assessable lakes caused the Forest Service and the Idaho Department of Fish and Game to reconsider treatment priority and objectives. Copies of the 1991 News Release was mailed to all 1990 respondents. There were four positive responses with treating Disappointment vs. Grassy Twin and one negative. The negative response dealt with the question of why access to Disappointment Lake couldn't just be improved to increase the fishing pressure? In response, there are several other nearby lakes that have relatively much better access, however, there is still a stunted brook trout fishery. Once a stunted population is established in this area, expected fishing pressure will not circumvent it. The Forest Service and the Idaho Department of Fish and Game also desire to provide varied fishing opportunities, and treatment of an inaccessible lake, such as Disappointment, will help accomplish this.

Other questions raised were; can the water in Lost Valley Reservoir be drawn down to improve the project effectiveness and what about the fish in Lost Creek below the reservoir? In response, the Lost Valley Reservoir Users Association was informed of project objectives in early Spring, 1991, and they have managed their water resources to optimize the project's effectiveness. Regarding the fish in Lost Creek below the reservoir outlet, crews will attempt to salvage the fish in Lost Creek prior to treatment and *transplant* them to the Weiser River.

FINDING OF NO SIGNIFICANT EFFECT

Appendix A. Continued.

The actions proposed under this Decision Memo will have no significant environmental effects. I have determined that no extraordinary circumstances exist that might cause the action to have significant effects; therefore, the action is categorically excluded from documentation in an environmental impact statement or an environmental assessment. This action falls within Categories 2 and 6, Forest Service Handbook 1909.15, ID#3, Sec. 26.2, (wildlife management activity, such as improving habitat); types of projects which are typically excluded from further environmental assessment.

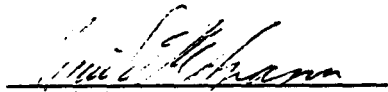
DECISION

It is my decision to use rotenone to rehabilitate Lost Valley Reservoir and Disappointment Lake by removing the undesirable fish species in each lake. This project is consistent with the management direction, including standards and guidelines, in the Payette National Forest Land and Resource Management Plan and the current Five Year Fish and Wildlife Program plan.

IMPLEMENTATION AND REQUEST FOR REVIEW

This decision is subject to administrative appeal pursuant to 36 CFR 217. Any appeal of this decision must include the information required by 36 CFR 217.9, (Content of a notice of appeal), including the reasons for appeal. Two copies of the Notice of Appeal must be filed with the Forest Supervisor, Payette National Forest, P.O. Box 1026, McCall, Idaho 83638 within 45 days of the date of publication of this decision in the Star News, with a simultaneous copy to the responsible officer (below) within 7 calendar days of publication in this newspaper.

For further information contact Al Becker at the New Meadows Ranger District, PO Box J, New Meadows, Idaho 83654 or telephone (208) 347-2141.



David M. Sparr
New Meadows District Ranger
PO Box J
New Meadows, Idaho 83654

9/12/91

Date

FINAL REPORT

Disappointment Lake Rotenone Treatment

Disappointment Lake was chemically treated on September 27, 1991. The lake was treated with a concentration of 0.25 ppm of Roussel Bio, Noxfish (5% rotenone). A total of 36 gallons of chemical was used to treat an estimated 436 acre-feet of water in the lake.

The chemical was applied with a Soloy 12E4J helicopter. The helicopter was equipped with a 32-foot spray boom which was used to evenly distribute the chemical, maximizing mixing efficiency. An on-the-ground observer, equipped with a two-way radio was at the lake in order to communicate with the helicopter. This proved valuable to verify to the pilot that he was at the correct lake, due to the large number of other alpine lakes in the vicinity. It took two trips with the helicopter to apply the 36 gallons (18 gallons/trip) needed. In addition to the treatment of the lake itself, three 1-quart drippers of pure rotenone were placed on three small tributary streams that entered the lake.

To allow the rotenone to mix in the lake before it could escape into the outlet stream and jeopardize downstream fisheries, a small 6-inch high dam with a 3-inch high spillway was constructed out of rocks, gravel, and visqueen. It was calculated from flow measurements in the outlet stream that this would allow for approximately five days of water storage before water would crest the spillway. The spillway will remain in place until the spring of 1992.

The weather was clear, warm, and calm on the day of the treatment. Limnological conditions of the lake were sampled two days prior to the treatment. Results of that sample are recorded in Table 1.

Table 1. Temperature and Dissolved Oxygen Profiles in Disappointment Lake on September 25, 1991

Depth (m)	Temperature (C)	Dissolved Oxygen (ppm)
0	14.0	8.8
1	13.5	9.0
2	12.5	9.0
5	12.0	8.8
7	11.0	10.6
8	8.5	10.6
9	7.5	10.3
10	6.0	9.8
13	5.0	5.3
15	4.5	4.0
20	4.5	4.2

Three days after the treatment was completed, the lake was revisited to check for fish and to see if the lake was spilling over the dam. At that time the lake had not crested the dam and many dead brook trout *Salvelinus fontinalis* averaging 195 mm were observed. Several small juvenile brook trout were observed dead in the three small inlet streams. The lake will be gill netted in the spring of 1992 to evaluate the success of the treatment.

The use of a helicopter on the lake was invaluable. The helicopter made what would have been a very difficult project into one that was very simple. It saved days in manpower, eliminating the need to get chemical and equipment to the lake. In addition, the helicopter dispersed chemical very evenly, speeding mixing time and reducing the number of chemical hot and cold spots.

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fisheries Management
Investigations

Project: F-71-R-16

Title: Region 3 (McCall) Lowland Lakes
and Reservoirs Investigations

Job No.: 3-b¹ (McCall)

Period Covered: July 1, 1991 to June 30, 1992

ABSTRACT

Payette Lake

Management programs undertaken in 1991 focused primarily on estimating kokanee Oncorhynchus nerka kennerlyi standing crops and, to a limited degree, on lake trout Salvelinus pamaycush tagging.

Hatchery kokanee fingerling survival was undetermined in 1991. Problems were encountered with the aging of the hatchery fish captured. Mean density estimates from trawling of age 0+ (wild) and 1+ (wild and stocked) kokanee were 75 and 39 fish/hectare, respectively. The total population estimate of age 0+ and 1+ kokanee was 128,070 and 67,551, respectively. The total biomass estimate for all kokanee age classes combined was around 6.8 kg, which includes the 1991 spawner escapement biomass estimate. However, fish more than 180 mm that did not spawn this year and the population of shoreline spawning adults are largely unaccounted for in this biomass estimate.

Estimated survival of the 1990 potential kokanee egg deposition to 1991 fall fingerling was 3.2%.

A total of 152 lake trout have been tagged with reward tags since 1988, 25 of which were tagged in 1991. Of all fish tagged, 10 are known dead through 1991. In 1991, four tagged fish were recaptured and released, and six fish were caught and killed. Since 1988, a total of 10 tagged fish have been recaptured and killed, while 16 have been caught and re-released. The harvest exploitation rate of lake trout in 1991 was 4% to 5%. Catch-and-release exploitation was 3%. These estimates were made using some erroneous assumptions. These include 100% tag return rate, 100% tag retention, and 100% survival of tagged fish. Fish caught and tagged ranged in size from 1.5 to 32 lbs.

Warm Lake

To evaluate the put-and-take fishery in Warm Lake, 299 of the total 15,000 put-and-take rainbow trout O. mykiss planted in Warm Lake were tagged with \$5.00 reward jaw tags. A total of 22 \$5.00 reward tags were returned to the Idaho Department of Fish and Game for a 7.4% return.

A total of 57 fish were captured in gill nets. Of these, the species composition was 35 whitefish Prosopium williamsoni, 4 rainbow-cutthroat trout O. clarki hybrids, 4 rainbow trout fingerling, 4 brook trout S. fontinalis, 4 kokanee, 2 put-and-take holdovers, 1 lake trout, and 1 bull trout S. confluentus. The two put-and-take holdovers were 244 mm and 260 mm. The bull trout was large at 669 mm and 2,900 g.

Information gathered from the trawling effort was quite interesting. There were no fish smaller than 130 mm collected. There were an estimated 79 kokanee/hectare in the 130 mm to 190 mm range and 7.5 kokanee/hectare of fish more than 190 mm. Confidence intervals were wide at +75%. Kokanee growth rates were poor. One 195 mm kokanee collected in gill nets was aged with otoliths at 3+. Two kokanee of 120 mm and 147 mm were both aged at 2+.

Little Payette Lake

Little Payette Lake has the unique Pennask strain of rainbow trout (Janssen and Anderson, 1992). In Idaho, the Pennask rainbow is found only in Little Payette Lake. In the interest of developing a broodstock of Pennask strain rainbow trout, fish were collected from Little Payette Lake to sample for diseases. Fish were collected twice in 1991. Eleven fish were collected when the fish ran up Lake Fork Creek to spawn. Test results on this small sample came back positive for Bacterial Kidney Disease (BKD). Consequently, another larger sample of 60 fish was collected with gill nets in October. Species and strain composition and age and growth information was also obtained from the fish collected. Also, Lake Fork Creek above Little Payette Lake was monitored by McCall Fish Hatchery personnel to determine spawning run size and timing of Little Payette Lake rainbow trout.

BKD was found in 37 of the 60 rainbow trout tested the second time using the Enzyme-Linked Immunosorbent Assay (ELISA) procedure. The Fluorescent Antibody Test (FAT) procedure showed no incidence of BKD. Of the 37 fish that were positive, optical densities of BKD were low for 36 fish and moderate for 1 fish. No high densities were found.

A total of 79 rainbow trout were collected in gill nets. Of these, 15 were Pennask, 61 were Kamloops, and 3 were unidentified to strain. Of the 15 Pennask collected, 11 (73%) were more than 16 inches and they averaged 447 mm (17.6 inches). The largest was 466 mm (18.3 inches) and 1,130 g (2.49 lbs). Of the 61 Kamloops collected, 9 (15%) were more than 16 inches and they averaged 481.5 mm (19 inches). The largest was 565 mm (22.25 inches) and 1,660 g (3.66 lbs).

The 11 Pennask spawners collected averaged 372.3 mm and 594 g and ranged from 338 mm to 464 mm. Age information from otoliths showed that all spawners collected were age 3+, which were the original Pennask stocked the first season after the treatment. In addition to the rainbow trout collected, 48 squawfish Ptychocheilus oregonensis and 21 largescale suckers Catostomus macrocheilus were collected.

A rough estimate of 100 to 200 spawning pairs of rainbow trout were found in Lake Fork Creek above Little Payette Lake. The timing of the run was late May through late June.

Smallmouth bass Micropterus dolomieu less than 12 inches have been stocked annually in Little Payette Lake since 1988 in an attempt to help control the suckers, squawfish, and kokanee found in the reservoir. On July 15, 1991, approximately 1/4 mile of Little Payette Lake was snorkeled to document whether or not any natural reproduction and recruitment of smallmouth bass was occurring. Two swarms of smallmouth bass black fry and three yearlings were found.

Goose Lake

To evaluate the put-and-take fishery in Goose Lake, 280 of the 4,000 put-and-take rainbow trout stocked in Goose Lake were tagged with \$5.00 reward jaw tags. A total of 47 tags were recovered from anglers for a 16.8% return rate. Returns were spread out through the summer and fall months. One fish was recovered in June (the month stocked), 15 in July, 11 in August, 14 in September, and 2 in October.

Hells Cannon Reservoir Complex

In 1992, a smallmouth bass regulation change will go into effect for Oxbow Reservoir. The new regulation will be a protected slot of 12 to 16 inches with a daily limit of two fish out of the slot. Also, harvest of any bass will not be allowed until July 1.

In order to evaluate the effects of the new regulation, baseline data was collected on Oxbow and Hells Canyon reservoirs. For age determination and back-calculations, scales were taken from 72 and 76 fish from Hells Canyon and Oxbow reservoirs, respectively.

A total of 500 smallmouth bass in Oxbow and 554 in Hells Canyon were collected and measured. In both lakes, fish were aged up to 7+ years. Growth of Hells Canyon smallmouth bass was found to be slower than in Oxbow Reservoir. In Oxbow, the average back-calculated length of 3 year old fish was 207 mm, in Hells Canyon the average was 190 mm.

Lost Valley Reservoir

Lost Valley Reservoir has not been stocked with rainbow trout since 1989. This was due to the presence of a large "stunted" population of yellow perch *Perca flavescens* in the reservoir. In the fall of 1991, rotenone was used to remove all fish from the reservoir and any of its drainage that contained yellow perch. Rainbow trout put-and-take (25,000) and fingerling (45,000) will be stocked in the reservoir in the spring of 1992.

Copies of the required permits and the final report on the project itself are presented in Appendix A.

Granite Lake

In July 1990, 20,100 Eagle Lake strain rainbow trout fingerling were planted in Granite Lake. These fish were stocked in hopes that they would utilize the large population of redbase shiners *Richardsonius balteatus* found in the lake. Survival of these fish was examined in 1991. Also, a total of 3,000 Kamloops strain put-and-take size rainbow trout are planted annually.

On July 16, 1991, four 150-ft experimental gill nets were set in Granite Lake. Of the four nets, two were diving nets and two were floating nets.

A total of 26 fish were collected in 78 net hours. Of the 26 fish caught, 19 were 1991 put-and-take stocked fish, 4 were brook trout, 1 was a put-and-take holdover from 1990, 1 was a wild rainbow, and 1 was an Eagle Lake strain rainbow trout. The Eagle Lake strain rainbow trout was only 189 mm and 60 g. Inspection of stomachs revealed that one brook trout, the wild rainbow, and the holdover put-and-take were utilizing redbase shiners.

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OBJECTIVES

To maintain information for fishery management activities and decisions for lowland lakes and reservoirs.

INTRODUCTION

Payette Lake

Payette Lake was previously described by Grunder et al. (1990a). Management programs undertaken in 1990 focused primarily on kokanee Oncorhynchus nerka kennerlyi standing crops and, to a limited degree, on lake trout Salvelinus namaycush tagging.

Warm Lake

In 1990, several complaints were received about poor fishing in Warm Lake. In October 1990, the lake was gill netted to examine present fish populations. A large number of put-and-take rainbow trout O. mykiss were found, including holdovers from the two previous years (Janssen and Anderson, 1992). Therefore, in 1991, the percent return of put-and-take fish to the creel and the number of holdovers present in the spring of 1991 was examined.

In the October 1990 gill netting, a large number of small shoreline-spawning adult kokanee were also collected. These fish were sent to a National Marine Fisheries Service (NMFS) lab for electrophoretic analysis (Janssen and Anderson, 1992). Results indicated that these fish were unlike any other known stocks in Idaho. These fish were different than the kokanee stocked in Warm Lake in 1990 (Janssen and Anderson, 1992). Since the kokanee collected were quite small (average 233 mm), were not of hatchery origin, and there were complaints of poor fishing, information about kokanee densities was collected.

Little Payette Lake

Little Payette Lake is the only Idaho water with the Pennask strain of rainbow trout (Janssen and Anderson, 1992). In the interest of developing a broodstock of Pennask strain, rainbow found in Little Payette Lake were collected for disease analysis. Length, weight, and age information was also taken from all fish collected.

Adult smallmouth bass less than 12 inches have been stocked in Little Payette Lake since 1989 to help slow down the population growth of squawfish Ptychocheilus oregonensis, suckers Catostomus macrocheilus, and kokanee that have reappeared in the reservoir. The extent and success of natural reproduction and recruitment of smallmouth bass was examined.

Goose Lake

Goose Lake is stocked annually with 4,000 put-and-take rainbow trout and 30,000 to 50,000 2- to 3-inch cutthroat trout O. clarki. In 1991, a study was initiated to examine the success of the put-and-take trout program.

Hells Canyon Reservoir Complex

In 1992, a smallmouth bass regulation change will go into effect for Oxbow Reservoir. The new regulation will be a protected slot of 12 to 16 inches with a daily limit of two fish out of the slot. Also, harvest of any bass will be allowed only from July 1 through December 31.

In order to evaluate the effects of the new regulation, baseline data was collected on Oxbow and Hells Canyon reservoirs. Data from Hells Canyon will be used as a control to further help assess any changes in the smallmouth bass population structure due to the regulation change.

Lost Valley Reservoir

Lost Valley Reservoir has not been stocked with rainbow trout since 1989, due to the presence of a large "stunted" population of yellow perch *Perca flavescens*. In the fall of 1991, rotenone was used to remove all fish from the reservoir and any of its drainage that contained yellow perch. Put-and-take (25,000) and fingerling (45,000) rainbow trout will be stocked in the reservoir in the spring of 1992.

Granite Lake

In July 1990, 20,100 Eagle Lake strain rainbow trout fingerling were planted in Granite Lake. These fish were stocked in hopes that they would utilize the large population of redbreast shiners *Richardsonius balteatus* found in the lake. Survival of these fish was examined in 1991. Also, a total of 3,000 Kamloops strain put-and-take size rainbow trout are planted annually.

METHODS

Payette Lake

Kokanee were sampled in Payette Lake on September 6 and 7, 1991 with a mid-water trawl. Methodology for trawling technique was reported by Bowles et al. (1986, 1987) and Grunder (1990b).

Lake trout were captured by hook-and-line by volunteer fishermen throughout the spring and summer. These fish were tagged with \$5.00 reward cinch-up spaghetti tags. Any recaptures were recorded and then released. Tagged fish caught and reported by other anglers were recorded.

Warm Lake

Of the 15,000 put-and-take rainbow trout planted in Warm Lake in 1991, 299 or 1.99% were tagged with \$5.00 reward jaw tags. A 100% return rate to the Idaho Department of Fish and Game was assumed for all tags recovered by anglers.

The lake was gill netted on June 3, 1991. Four nets were set overnight, fishing an average of 18.75 hours. Two floating nets and two diving nets were used. Each net was set perpendicular to shore, with the small mesh end of the net alternately placed on the shore and deep ends. Each net was a 150-ft experimental net.

The kokanee trawler was used on Warm Lake on the night of July 8, 1991. Four transects were completed. No bathymetric maps were available for Warm Lake, consequently only fish densities were estimated.

Little Payette Lake

Lake Fork Creek above Little Payette Lake was monitored by McCall Fish Hatchery personnel to determine spawning run size and timing of Little Payette Lake rainbow trout. Adult rainbow trout were collected during the spawning run with fishing gear for disease analysis. Lengths and weights were recorded and otoliths taken for age determination.

Test results on this small sample came back positive for Bacterial Kidney Disease (BKD). Consequently, another larger sample of 60 fish was collected with gill nets in October. Species and strain composition and age and growth information was also obtained from the fish collected.

Pennask strain were separated from Kamloops (the other rainbow trout strain present in Little Payette Lake) by their unique body shape, spotting pattern, and fin clips. They are long and slender with rainbow trout coloring and cutthroat trout spotting patterns (spots concentrated posteriorly and few or no spots anterior to the dorsal fin). Personal communications with fishery biologists in British Columbia, where the Pennask is native, confirmed the unique shape, color, and spotting patterns of these fish. Since 1989, all Pennask stocked in Little Payette Lake have been adipose-clipped. The Kamloops were larger fish when stocked and show the typical fin erosion.

Tissue and fluid samples needed for the disease sampling were taken by Eagle Fish Health Lab personnel.

On July 15, 1991, approximately 1/4 mile of Little Payette Lake shoreline was snorkeled to document whether or not any natural reproduction and recruitment of smallmouth bass was occurring.

Goose Lake

Reward (\$5.00) jaw tags were put on 280 of the total plant of 3,190 put-and-take rainbow trout. A 100% return rate to the Idaho Department of Fish and Game was assumed for all reward tags recovered by anglers.

Hells Canyon Reservoir Complex

Both Oxbow and Hells Canyon Reservoirs were electrofished in May 1991. Three electrofishing boats from the Idaho Department of Fish and Game (Department) and one from the Oregon Department of Fish and Wildlife were used. Ten 1/4-mile transects were electrofished in both reservoirs. Total lengths, weights, and scales were collected from five fish from each 5 mm length increment and all fish over 300 mm. Lengths were taken on all other fish. Scales were later aged on a microfiche machine. Scale annuli were measured and used for age and growth back-calculations.

Lost Valley Reservoir

Lost Valley Reservoir was chemically renovated with liquid rotenone following standard Department procedures (Horton and Van Vooren, 1992).

Granite Lake

On July 16, 1991, four 150-ft experimental gill nets were set in Granite Lake. Of the four nets, two were diving nets and two were floating nets. Each net was set perpendicular to shore. The small mesh end of the net was alternated between the shore end and the deep end of the set. A net was set approximately every 1/4 of the way around the lake. Each net fished an average of 19.5 hours. Eagle Lake strain rainbow trout were identified by size and fin condition (good).

RESULTS

Payette Lake

Kokanee Population Status

Estimated abundance of age 0+ wild kokanee in Payette Lake in September 1991 was 168,000 fish (Table 1). The estimate of age 1+ kokanee was 67,500 fish, which included both wild and hatchery fish. Hatchery fish, which are usually discriminated from wild/natural fish by otoliths, presented a problem this year. In the past, age 1+ wild and 0+ hatchery fish overlapped in size. In 1991, this did not happen. Instead we found two age 1+ length groups; one ranged from 90 mm to 110 mm and the other 120 mm to 180 mm. One fish in the later range, which was an obvious hatchery fish with eroded opercles, had a very clear annulus on the otolith. We do not know whether this larger age 1+ group of fish is all hatchery fish or not. It is possible that this year's hatchery plant put down an annulus when stocked and then put on good growth. It is also possible that we had good survival but poor growth of the 1990 kokanee stocking.

An estimated 128,070 age 0+ wild fish and 267,551 age 1+ wild and stocked kokanee were present. Survival of the 1990 cohort through 1991 was undetermined, due to the stock identification problems.

Estimated mean densities (fish/hectare) of age 0+ and 1+ were 75 and 39 fish/hectare, respectively (Table 1).

Total kokanee biomass, not including adult fish (this year's spawners), was estimated at 1.38 kg/hectare. Total biomass, including 1991 spawner escapement estimates, was 6.8 kg/hectare. This biomass estimate includes very few fish more than 180 mm in length that did not spawn this year. In addition to this estimate, there is a shoreline spawning kokanee population about which virtually nothing is known.

The estimated survival of the 1990 potential egg deposition ((19,282 fish * .48 female ratio) * 650 eggs/female = 6,015,984) to 1991 fall fry (128,070 * 1.5 = 192,105) was around 3.2%. In order to compare spawner escapement to trawling fry population estimates, the fry estimate was multiplied by 1.5 to account for inefficiencies in the trawl (Bruce Reiman, Idaho Department of Fish and Game, personal communication).

Table 1. Summary of mid-water trawl data collected at Payette Lake, Idaho, 1980, 1988, 1989, 1990, and 1991.

Year of Estimate	Number Stocked	Age				Adult Spawners (3+) ²
		0+	1+	2+	3+ ¹	
<u>Number of Hatchery Kokanee</u>						
1988	350,000	34,000	0	0		
1989	350,000	18,000	0	0		
1990	301,000	27,000	0	0		
1991	158,000	?	?	0		
<u>Number of Wild/Natural Kokanee</u>						
1980		100,000	73,000	16,000	20,000	
1988		75,000	<2,000	9,000	**	26,400
1989		120,000	21,000	0	**	16,800
1990		134,000	26,000	10,000	**	19,200
1991		128,000	67,500 ³	1,187	**	20,800
<u>Mean Kokanee Density (fish/hectare)</u>						
1980		50	36	8	10	
1988		43	20	5	NA	15.4
1989		72	22	5	NA	9.8
1990		78	34	3	NA	11.2
1991		75	39 ⁴	0.69	NA	12.1

¹ These fish will spawn this fall.

² Based on spawner escapement counts in the North Fork Payette River.

³ Includes wild and stocked fish.

⁴ Includes hatchery fish of unknown age.

** Estimates not reliable because fish more than 200 mm are not completely vulnerable to the trawl.

Lake Trout Population Status

A total of 152 lake trout have been tagged with reward tags since 1988, 25 of which were tagged in 1991 (Table 2). Of all the fish tagged, a known 10 are dead through 1991. In 1991, four tagged fish were recaptured and released, and six fish were caught and killed. Since 1988, a total of 10 tagged fish have been recaptured and killed, while 16 have been caught and re-released. The harvest exploitation rate of lake trout in 1991 was 4% to 5%. Catch-and-release exploitation was approximately 3%. These estimates were made using some assumptions that are erroneous. These include 100% tag return rate, 100% tag retention, and 100% survival of tagged fish. Therefore, the estimates made are minimums. Weights of fish caught ranged from 1.5-to 32 pounds.

Table 2. Payette Lake lake trout tagging information from 1988 through 1991.

Year	New Tags	Tags Caught and Released	Number of Tags Caught and Fish Killed
1988	73	4	3
1989	16	0	0
1990	38	8	1
1991	25	4	6
Total	152	16	10

Warm Lake

A total of 22 \$5.00 reward tags on fish released on May 20 were returned to the Idaho Department of Fish and Game through the end of the year. This was 7.4% of the total number of tagged fish released.

A total of 57 fish were captured in gill nets. Of this total, the species composition was 35 whitefish Prosopium williamsoni, 4 rainbow X cutthroat hybrids, 4 rainbow trout fingerling, 4 brook trout Salvelinus fontinalis, 4 kokanee, 2 put-and-take holdovers, 1 lake trout, and 1 bull trout S. confluentus. The two holdover put-and-take trout were 244 mm and 260 mm. The bull trout was large at 669 mm and 2,900 g.

Information gathered from the trawling effort was quite interesting. There were no fish smaller than 130 mm collected. There were an estimated 79 kokanee/hectare in the 130 mm to 190 mm range, and 7.5 kokanee/hectare of fish more than 190 mm. Confidence intervals were wide at +75%. The larger age group was sexually mature and looked like they would spawn in the fall of 1991. Kokanee growth was quite poor. One 195 mm kokanee collected in gill nets was aged with otoliths at 3+. Two kokanee of 120 mm and 147 mm were both aged at 2+.

There were two distinct flesh colors found in the main (smaller length) group of kokanee caught in the trawl. Flesh color has been found to be unique among different strains of kokanee (Bruce Reiman, Idaho Department of Fish and Game, personal communication). This might be explained by the stocking of hatchery fish in 1990.

Little Payette Lake

A rough estimate of 100 to 200 spawning pairs of rainbow trout were found in Lake Fork Creek above Little Payette Lake. The run occurred from late May through late June. A total of 11 spawning rainbow trout were collected for disease analysis. Test results indicated the presence of BKD.

A total of 79 rainbow trout were collected with gill nets in October for more disease work. Species and strain composition and age and growth information **were also** obtained from the fish collected.

Of the 60 rainbow trout collected for the second testing, BKD was found in 37 fish using the Enzyme-Linked Immunosorbent Assay (ELISA) procedure. The Fluorescent Antibody Test (FAT) procedure showed no incidence of BKD. Of the 37 fish that were positive, optical densities of BKD were low for 36 fish and moderate for 1 fish. No high densities were found.

Of the 79 rainbow trout collected in gill nets, 15 were Pennask, 61 were Kamloops, and 3 were unidentified by strain. Of the 15 Pennask collected, 11 (73%) were more than 16 inches and averaged 447 mm (17.6 inches). The largest was 466 mm (18.3 inches) and 1,130 g (2.49 lbs). Of the 61 Kamloops collected,

9 (15%) were more than 16 inches and averaged 481.5 mm (19 inches). The largest was 565 mm (22.25 inches) and 1,660 g (3.66 lbs). Size composition of the gill net sample exceeded the trophy management goal of 20% greater than 16 inches.

The 11 Pennask spawners collected averaged 372.3 mm and 594 g and ranged from 338 mm to 464 mm. Age information from otoliths showed that all spawners collected were age 3+, which were the original Pennask stocked the first season after the rotenone treatment in 1987.

In addition to the rainbow trout collected, 48 squawfish and 21 largescale suckers were collected. All squawfish collected appeared to be of the same cohort, averaging 30.1 mm and ranging from 280 mm to 320 mm. Suckers ranged from 310 mm to 445 mm. A spawning run of largescale suckers was observed in Lake Fork Creek in the spring of 1991.

Two swarms of black fry and three juvenile smallmouth bass were observed with the snorkeling effort. Less than 10 adult smallmouth bass were observed. No other species were observed.

In addition to the above activities, about 250 Little Payette Lake pre-spawning adult kokanee were electrofished from Lake Fork Creek and moved to Fall Creek (a tributary to Payette Lake).

Goose Lake

A total of 47 \$5 reward tags were recovered from anglers through the end of the year, for a 16.8% return rate. Returns were spread out through the summer and fall months. One fish was recovered in June (the month stocked), 15 in July, 11 in August, 14 in September, and 2 in October.

Hells Canyon Reservoir Complex

A total of 500 smallmouth bass in Oxbow and 554 in Hells Canyon were collected and measured. Length frequencies of these fish are presented in Figures 1 and 2. For age determination and back-calculations, scales were taken from 76 and 72 fish from Oxbow and Hells Canyon reservoirs, respectively. In both lakes, fish were aged up to 7+ years. Growth of Hells Canyon smallmouth bass was found to be slower than in Oxbow Reservoir (Tables 3 and 4).

The number of smallmouth bass collected in each 1/4-mile transect on Hells Canyon Reservoir ranged from 18 to 170, and on Oxbow Reservoir from 8 to 150. The average number of smallmouth bass/transect was 67 and 55 for Hells Canyon and Oxbow, respectively.

Table 3. Average back-calculated lengths for each age class of smallmouth bass in Oxbow Reservoir.

Year Class	Age	Back-Calculated Age							
		N	1	2	3	4	5	6	7
1989	2	12	76	14					
1988	3	2	71	132	195				
1987	4	15	86	14	19	227			
1986	5	27	78	14	20	23	259		
1985	6	1	80	152	222	256	28	30	
1984	7	2	73	13	21	25	28	31	32
				0	4	8	7	0	7
All Classes			79	14	20	239	26	30	327
N		76	76	76	64	62	47	20	2

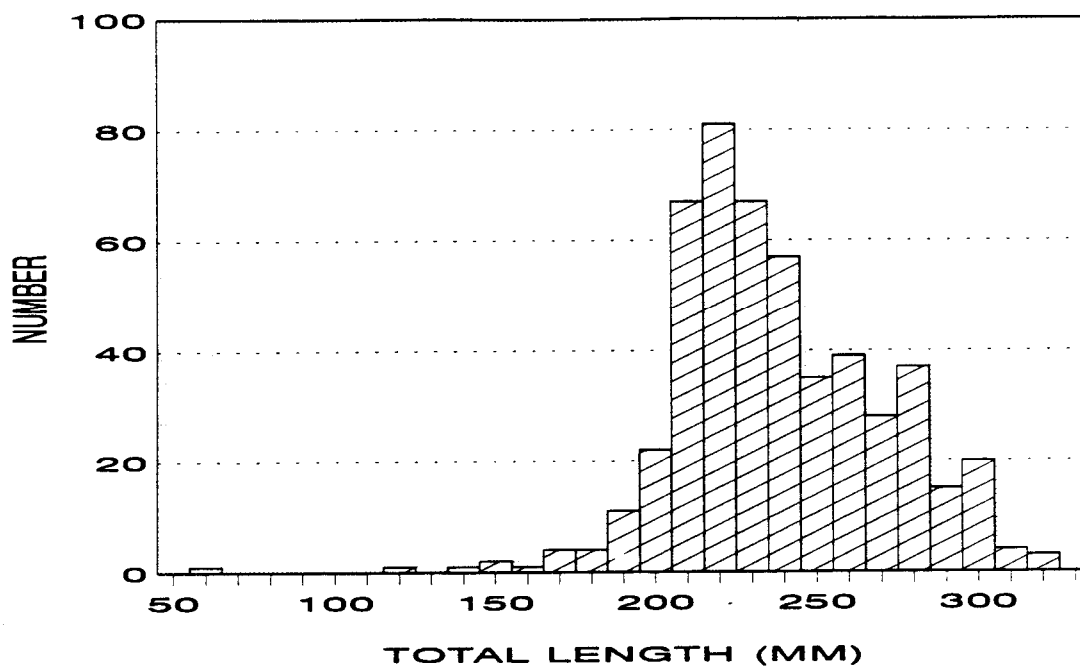


Figure 1. Length frequencies of Oxbow Reservoir smallmouth bass, collected by electrofishing, May 1991.

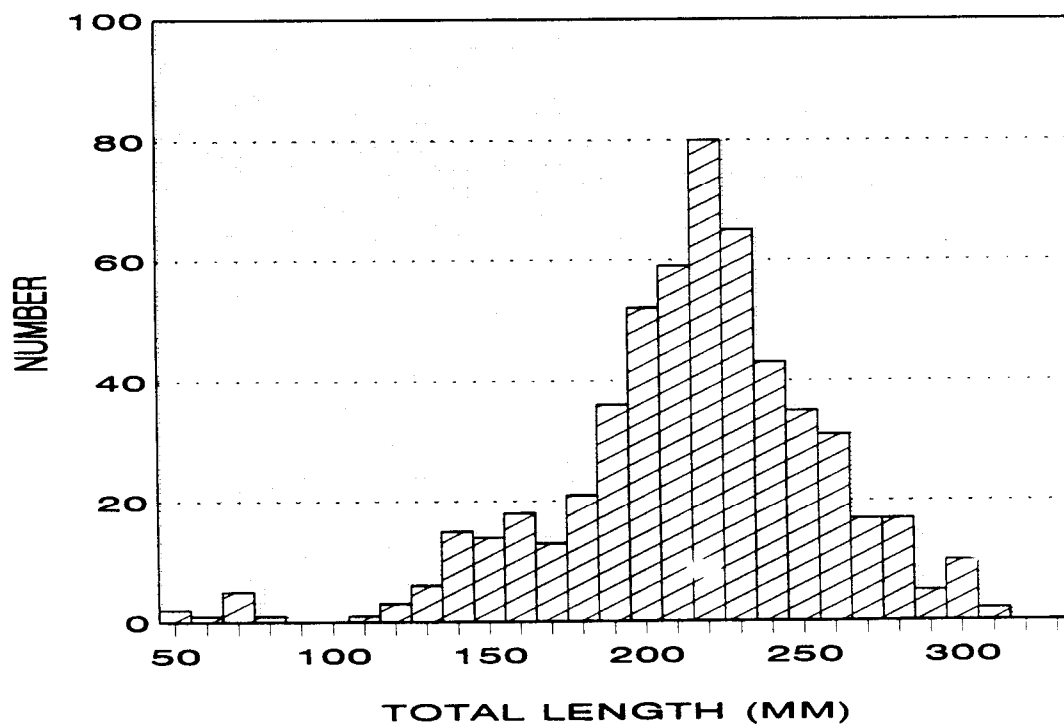


Figure 2. Length frequencies of Hells Canyon smallmouth bass, collected by electrofishing, May 1991.

Table 4. Average back-calculated lengths for each age class of smallmouth bass in Hells Canyon Reservoir.

Year Class	Aae	Back-Calculated Age							
		N	1	2	3	4	5	6	7
1989	2	1	72	14					
1988	3	1	72	125	18				
1987	4	1	75	13	18	21			
1986	5	1	77	14	196	22	25		
1985	6	1	75	14	20	24	27	29	
1984	7	1	67	13	18	20	23	26	28
				1	4	7	2	2	7
All Classes			74	13	19	22	26	29	28
N		7	72	72	57	45	31	14	1

Granite Lake

A total of 26 fish were collected in 78 net hours. Of the 26 fish caught, 19 were 1991 put-and-take stocked fish, 4 were brook trout (303, 277, 270, and 233 mm), 1 was a put-and-take holdover from 1990 (375 mm, 585 g), 1 was a wild rainbow (430 mm, 810 g), and 1 was an Eagle Lake strain rainbow trout. The Eagle Lake strain rainbow trout was only 189 mm and 60 g. Inspection of stomachs revealed that one brook trout, the wild rainbow, and the holdover put-and-take were utilizing redbside shiners.

DISCUSSION

Payette Lake

Because we cannot differentiate age classes of stocked kokanee, it would be very valuable to mark future years' fingerling plants. This would allow us to accurately determine growth and survival rates of these fish.

The kokanee spawning run in 1992 will be the progeny of the spawners counted in 1988. This will be the first year that we can track total survival of a single cohort.

Warm Lake

Warm Lake is a complex community of coldwater fish. Seven salmonid species and mountain suckers are all found here. All of these fish are competing for space and food in a relatively small (640 acres) oligotrophic lake. Growth of the planktivorous species is slow (ie., 3+ old kokanee at 195 mm and 140 mm of growth in 20 months for rainbow X cutthroat fingerling). These slow-growing fish are vulnerable to bull and lake trout for virtually their entire lives in Warm Lake.

The fingerling plants are having limited success with poor survival and growth. The rainbow trout put-and-take program performed poorly in 1991. The put-and-take program should be evaluated again in the next couple of years for duplication. If similar results are obtained, then the stocking program and fish management in general in Warm Lake should be examined. For now, fingerling plants should be discontinued to increase food availability and survival of wild and stocked put-and-take fish. Management to enhance fishing success in Warm Lake has relied on hatchery augmentation. More investigation of the carrying

capacity, the naturally-reproducing components of the population, and interactions with stocked fish is needed.

Little Payette Lake

Since the rainbow trout spawning run does not get into full swing until mid-June, a change in fishing regulations is needed for Lake Fork Creek. The season opening should be moved from the end of May to July 1.

More work is needed to determine the feasibility of using the Pennask strain rainbow trout in Little Payette Lake as an egg source. The spawning run size needs to be more accurately measured and more disease work completed. Run size should increase as more age classes begin to mature and spawn, as this year's run was made up largely of fish planted the first year after the treatment.

Gill net sampling showed that 19% of the rainbow trout in Little Payette Lake are Pennask. Pennask emigration is a concern because of the documented loss of fish to the system (see Job 3). The number of Pennask spawners below the dam was estimated at 100 to 200 pairs, comparable to the number in Lake Fork Creek above the lake. There does not appear to be a problem in the Kamloops strain of rainbow trout with emigration.

It is clear that largescale suckers and squawfish are well established in the lake and that it is only a matter of time before they begin to reduce growth and survival. It appears that young-of-the-year squawfish were missed with the 1987 rotenone treatment, evidenced by the presence of only one age class.

Smallmouth bass habitat appears to be marginal. Only limited spawning and recruitment success has been documented.

Goose Lake

Due to the poor return rate of reward-tagged fish, the return-to-creel evaluation should be repeated in 2 to 3 years. If results are the same, then the fish management strategy for Goose Lake should be reevaluated.

Hells Canyon Reservoir Complex

To determine the possible effects of the regulation change on other species of fish in the reservoir, a standard lowland lake survey should be completed on Oxbow Reservoir in 1992. This would include electrofishing, trap netting, and gill netting for all species present in the reservoir.

Lost Valley Reservoir

Results of the lake renovation are summarized in Appendix A.

Granite Lake

Growth and survival of the Eagle Lake strain rainbow trout fingerling was poor. This stocking should be discontinued. After reviewing the literature, it was determined that splake (brook trout X lake trout) had the characteristics needed to successfully utilize the habitat and food base (redside shiners) present in Granite Lake. Therefore, splake should be experimentally stocked in Granite Lake in the fall of 1992.

RECOMMENDATIONS

1. Continue to monitor kokanee Oncorhynchus nerka kennerlyi densities and biomass in Payette Lake.
2. Mark all hatchery-origin kokanee stocked in Payette Lake.
3. Monitor kokanee recruitment (Graduate Student) to Payette Lake.
4. Continue volunteer tagging of lake trout Salvelinus namaycush.
5. Repeat the evaluations of percentage of return of put-and-take stockings in Warm and Goose lakes within the next 3 years.
6. Complete a standard lowland lake survey on Oxbow Reservoir.
7. Move the season opening on Lake Fork Creek from late May to July 1.
8. Introduce splake (brook trout S. fontinalis X lake trout) into Granite Lake.
9. Evaluate recruitment of non-game fish in Little Payette Lake.
10. Document food habits of smallmouth bass Micropterus dolomieu in Little Payette Lake.

LITERATURE CITED

- Bowles, E.C., V.L. Ellis, C. Hatch, and D. Irving. 1986. Kokanee stock status and contribution of Cabinet Gorge Hatchery, Lake Pend Oreille, Idaho. Annual Progress Report FY1985. Agreement No. DE-A179-85BP22493. Project No. 85-339.
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A P P E N D I C E S

Appendix A. Copies of the required permits and the final report for the
Lost Valley Reservoir rotenone treatment project, September 1991.

APPLICATION FOR SHORT-TERM ACTIVITY EXEMPTION

Applicant: Idaho Department of Fish and Game (IDFG)

Contact Person: Don Anderson, 634-8137

Body of Water: Lost Valley Reservoir

Tributary To: Weiser River

Objective: To chemically eradicate stunted yellow perch and restock with rainbow trout.

Date: September 26, 1991

Evidence of protection or promotion of public Interest

Lost Valley Reservoir has a history of overpopulation by yellow perch and subsequent chemical rehabilitation by the IDFG. It was rehabilitated in 1959, 1964, and 1985 using rotenone and in 1972 using Antimycin (Fintrol). Each treatment resulted in greatly improved fishing for rainbow trout for the following 4-8 years.

Incomplete kills and illegal reintroductions allowed the yellow perch populations to rebuild to the point of overpopulation and stunting. The perch reduce survival and growth of rainbow trout and become a nuisance to anglers. The overpopulated perch average 6-7" and are unacceptable to anglers.

Following the 1985 eradication, catchable-size rainbow trout plants produced excellent fishing in 1986 through 1989. This resultant fishing was very popular and 59,000 angler hours of fishing was documented from May through September 1987. Natural spawning by the Eagle Lake strain demonstrated good growth and survival of the fingerling plants.

In 1989 perch began to enter the fishery. By 1990 juvenile perch were so numerous they seriously impacted trout growth and survival and interfered with angling. Many anglers complained of the decline in fishing quality to IDFG and Payette National Forest (PNF) personnel. A joint IDFG/PNF rotenone treatment was planned for October 1990, but was postponed when the irrigation district elected to store more water than usual as a hedge against another drought year.

The continued public input requesting improved trout fishing prompted the IDFG and PNF to reschedule the treatment for September 1991. Both agencies solicited public input on the proposed project with news releases and personal contacts. The PNF initiated a formal NEPA process. The comments showed strong support for the rehabilitation effort and maintenance of a trout fishery. IDFG and PNF personnel met with the Lost Valley Reservoir Irrigation Co. at their annual shareholders meeting and received a formal vote of support for the project. The irrigation company also agreed to fully cooperate with the agencies by releasing stored water and provide the least volume of water for treatment.

Prevention of long-term injury to beneficial use:

The IDFG plans to restock Lost Valley Reservoir in the spring of 1992 with catchable size rainbow trout to provide an immediate fishery. Additionally, we will stock fingerling Eagle Lake rainbows (a strain proven to do well in Lost Valley) in the summer of 1992.

Past surveys have documented yellow perch in Lost Creek upstream of the slackwater. As in past treatments, we will apply rotenone at the culvert near the mouth of the East Fork Lost Creek and treat the 2 miles of stream to the reservoir. Flow measurements will be taken within 3 days of the treatment to calculate the minimum amount of rotenone needed. We will use a calibrated drip applicator for this part of the treatment. Rainbow and brook trout also occupy this reach of stream, but are expected to repopulate from untreated areas upstream of the culvert which is a passage barrier to perch, but not the salmonid species.

The main body of the reservoir is expected to contain about 300 acre feet of stored water at the time of treatment. The irrigation company plans on releasing water to attain the minimum pool prior to the treatment. Within 3 days of treatment we will calculate an accurate estimate of water to be treated using the formula

$$V_s = \frac{h}{3} (A_1 + A_2 + \sqrt{A_1 A_2})$$

as described in Fisheries Techniques - Nielsen & Johnson, 1983.

We will conduct *in situ*, serial dilution bio assays at 1.0, 0.75, 0.50, 0.25 and 0.0 ppm of Roussel Biocorp Noxfish, a 5.02 formulation. We will treat at the lowest effective concentration as determined by a 4-hour exposure.

We plan to use a helicopter fitted with standard agricultural spray equipment to apply the rotenone to the entire perimeter, areas less than 0.3 m deep, and to "potholes." Small boats will apply rotenone to the deeper areas of the reservoir using venturi-type boat bailers. The lake will be sectioned by bouy lines. Each section will contain a known volume of water and will be assigned to one boat. Each boat will apply the amount of rotenone needed to attain the selected concentration.

The irrigation company has agreed to close the outlet valve at the dam when we begin to apply the rotenone. Therefore, Lost Creek will be essentially dewatered except for leakage. The leakage, however, will have toxic levels of rotenone. The local chapter of Trout Unlimited has agreed to have a 5-person crew available to salvage game fish from Lost Creek and transport them to a waiting IDFG hatchery truck containing a weak (1 ppm) potassium permanganate solution to neutralize the rotenone. These fish will be relocated to the Weiser River. Fish remaining in Lost Creek from the dam downstream about 3 1/2 miles to the confluence with an unnamed tributary will be killed. Depending on the amount of leakage, toxic concentrations may persist to the confluence of Lost Creek and the West Fork Weiser River.

Hypothetical situation:

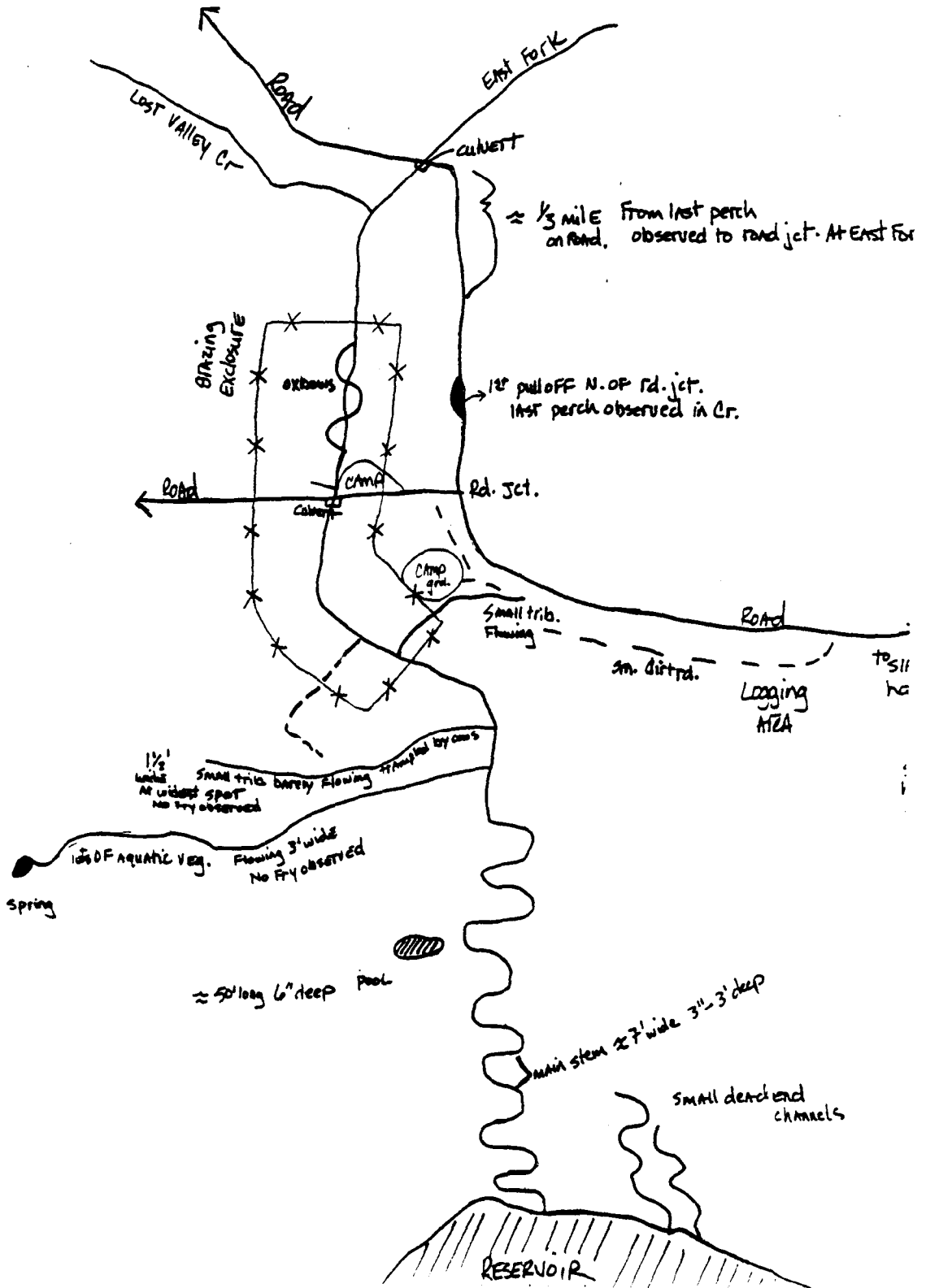
Assuming:

- 1) Lost Creek Q above reservoir is 10 cfs (approximately 1985).
- 2) Volume of storage in reservoir is 300 AF.
- 3) 0.75 ppm concentration rotenone needed.

We would:

- 1) Apply 1.6 gallons from drip station
- 2) Apply 67.5 gallons by boat application
- 3) Apply 7.5 gallons by helicopter

Appendix A. Continued.



FOREST
SERVICE
NEWS

PAYETTE NATIONAL FOREST

News Contact:
DAVID SPANN

347-2141

NEW MEADOWS RANGER DISTRICT
DRAWER J
NEW MEADOWS, ID 83654

July 1991

IMMEDIATE RELEASE

The New Meadows Ranger District and the Idaho Department of Fish and Game are proposing two lake rehabilitation projects on the New Meadows Ranger District. The two proposed lakes are: Lost Valley Reservoir and Disappointment Lake.

The population of yellow perch in Lost Valley Reservoir, on the Payette National Forest, has increased to the point of becoming a nuisance to anglers and is significantly reducing trout growth and survival. Lost Valley Reservoir is a very productive fishery habitat, however, the abundant yellow perch outcompete trout, the more desired fish species for the Reservoir. The yellow perch are so prolific in the Reservoir that they also compete with each other, resulting in a stunted overpopulation with an average size class of only four to six inches. Angler surveys have shown that rainbow trout are the preferred species to catch in Lost Valley Reservoir. The reservoir has previously been treated for perch control, but a 100% kill was apparently not achieved. This may have been due to perch in inlet streams, drawdown reservoir puddles, possible illegal planting, etc. Hopefully, the effectiveness will be more lasting this time and Lost Valley Reservoir will return to a quality trout, sport fishing opportunity for anglers.

Disappointment Lake is a backcountry lake on the East side of the Ranger District. It is located in the Hazard Creek drainage, however, there is no formal system trail to the lake. The primary reason for the Disappointment lake project is to replace the stunted brook trout population with a cutthroat trout fishery. There are other nearby and more accessible lakes that have brook trout and provide that sport fishing opportunity. The Grassy Twin lakes were considered for treatment last year. However, concern expressed by lake users in changing the fishing opportunity for such accessible lakes caused the Forest Service and Idaho Department of Fish Game reconsider treatment priority and objectives. There has not been prior treatment in high mountain lakes in this area, and this will give managers the opportunity to evaluate the effectiveness of this technique to improve other stunted trout fisheries.

The chemical to be used in these projects is Rotenone. Rotenone is naturally derived from plants in South America and is a commonly used fish toxicant. Its' toxic action to fish is it inhibits oxidation capability. Mammals, including humans, are not susceptible to the poison because they acquire their oxygen through the air and not in water. Rotenone is unstable and degrades rapidly with exposure to light, oxygen, heat and alkalinity. Most lakes treated with rotenone, are completely detoxified within five weeks following treatment.

The treatments are scheduled to occur in late September of this year. To be more cost efficient and effective, the water in Lost Valley Reservoir will need to be drawn down prior to treatment. The Lost Valley Water Users Association have been very cooperative and intend to manage their water resource to coordinate with this rehabilitation effort. Also, Lost Creek will be

Appendix A. Continued.

essentially dewatered when the outlet valve is closed at the beginning of treatment. Crews will attempt to salvage the fish in Lost Creek prior to the rotenone treatment and transplant them to the Weiser River. Fish remaining in Lost Creek may be lost either to dewatering or exposure to treated water leaking through the outlet.

Anyone with questions, comments or opinions on these proposed projects are encouraged to contact Al Becker at the New Meadows Ranger District office, or Don Anderson at the McCall IDFG office.

PAGE 3 THE STAR NEWS - THURSDAY, JULY 18, 1991

Clearing out of 2 lakes proposed

Lost Valley Reservoir and Disappointment Lake are being targeted to be cleared of fish and restocked by the Payette National Forest and the Idaho Department of Fish and Game.

The population of yellow perch in Lost Valley Reservoir, which is on the New Meadows Ranger District, has increased to the point of becoming a nuisance to anglers and is significantly reducing trout growth and survival.

Lost Valley Reservoir is a productive fishery habitat, but the abundant yellow perch compete with trout, the more desired fish species for the reservoir. The yellow perch are so prolific in the reservoir that they also compete with each other, resulting in a stunted overpopulation with an average size class of only four to six inches, a Payette news release said.

Angler surveys have shown that rainbow trout are the preferred species to catch in Lost Valley Reservoir. The reservoir has previously been poisoned for perch control, but a 100 percent kill was apparently not achieved.

This may have been due to perch in inlet streams, drawdown reservoir puddles, possible illegal planting, and other factors. Officials hope the effectiveness will be more lasting this time and that Lost Valley Reservoir will return to a quality trout, sport fishing opportunity for anglers.

Disappointment Lake is a backcountry lake on the east side of the New Meadows Ranger District. It is located in the Hazard Creek drainage, however, there is no formal trail system to the lake.

The primary reason for the Disappointment Lake project is to replace the stunted brook trout population with a cutthroat trout fishery.

There are other nearby and more

accessible lakes that have brook trout populations and provide that type of sport fishing opportunity. The Grassy Twin lakes were originally being considered for treatment last year.

However, concern expressed by lake users caused the forest service and F&G to reconsider treatment priority and objectives. There has not been prior treatment in high mountain lakes in this area, and this will give managers the opportunity to evaluate the effectiveness of this technique to improve other stunted trout fisheries.

The chemical to be used in these projects is rotenone, which is naturally derived from plants in South America and is a commonly used fish toxicant. Its toxic action to fish is that it inhibits oxidation.

Mammals, including humans, are not susceptible to the poison because they acquire their oxygen through the air and not in water. Rotenone is unstable and degrades rapidly with exposure to light, oxygen, heat and alkalinity. Most lakes treated with rotenone, are safe within five weeks following treatment.

The treatments are scheduled to occur in late September. To be more effective, the water in Lost Valley Reservoir will be drawn down prior to treatment. The Lost Valley Water Users Association intend to manage their water to coordinate with this rehabilitation effort.

Also, Lost Creek will be de-watered when the outlet valve is closed at the beginning of treatment. Crews will attempt to salvage the fish in Lost Creek prior to the rotenone treatment and transplant them to the Weiser River. Fish remaining in Lost Creek may be lost, either to de-watering or exposure to treated water leaking through the outlet.

Appendix A. Continued.

FOREST
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PAYETTE NATIONAL FOREST

News Contact:
DAVID SPANN
347-2141

NEW MEADOWS RANGER DISTRICT
DRAWER J
NEW MEADOWS, ID 83654

IMMEDIATE RELEASE

The population of yellow perch in Lost Valley Reservoir, on the Payette National Forest, has increased to the point of becoming a nuisance to anglers and is significantly reducing trout growth and survival. Lost Valley Reservoir is a very productive fishery habitat, however, the abundant yellow perch outcompete trout, the more desired fish species for the Reservoir. The yellow perch are so prolific in the Reservoir that they also compete with each other, resulting in a stunted overpopulation with an average size class of only three to four inches.

The Idaho Department of Fish and Game and the Payette National Forest intend to possibly chemically eradicate the reservoir in late September this year with rotenone. Rotenone is a plant-derived poison that is the most commonly used method to eliminate nuisance fish from lakes. Its' toxic action to fish is it inhibits oxidation capability. Mammals, including humans, are not susceptible to the poison because they acquire their oxygen through the air and not in water.

To be more cost efficient and effective, the water would have to be drawn down in the reservoir prior to treatment. This will be contingent on the water needs and water prospects of the Lost Valley Reservoir Irrigation District. Rotenone would be applied in liquid form throughout the reservoir in concentrations necessary to achieve a total fish kill. No hatchery stocking was done in 1989 or 1990, but 1987 and 1988 fingerling plants still provide some sport fishing opportunity. Because of this possible eradication effort, the IDFG Commission has lifted the fishing bag, possession and size limits on Lost Valley Reservoir until November 1, 1990.

Rotenone is unstable and degrades rapidly with exposure to light, oxygen, heat and alkalinity. Most lakes treated with rotenone, are completely detoxified within five weeks following treatment. Lost Creek will be essentially dewatered when the outlet valve is closed at the beginning of treatment. Crews will attempt to salvage the fish in Lost Creek prior to the rotenone treatment and transplant them to the Weiser River. Fish remaining in Lost Creek may be lost either to dewatering or exposure to treated water leaking through the outlet.

Lost Valley Reservoir has been previously poisoned for perch control, but a 100% kill was apparently not achieved. This may have been due to perch in inlet streams, drawdown reservoir puddles, possible flagrant planting, etc. Hopefully, the effectiveness will be more lasting this time and Lost Valley Reservoir will return to a quality trout, sport fishing opportunity for anglers.

Anyone with questions, comments or opinions on this proposed project are encouraged to contact Al Becker at the New Meadows Ranger District office, or Don Anderson at the McCall IDFG office.

SUMMARY FOR MONTH OF October 1985

Name Don Anderson Assignment Reg. Fish. Manager Date 11/5,

Field Days 7 Miles in Assigned Vehicle..... 400
 Meeting ~Days 4

Office Days 7 Total Per Diem \$.. 51.00

SUMMARY OF ACTIVITIES AND OBSERVATIONS

Lost Valley Reservoir Eradication--9 October

Region 3 fishery personnel, McCall Hatchery personnel and the Payette National Forest Zone Fisheries Biologist eradicated fish populations in Lost Valley Reservoir on 9 October. The chemical treatment was needed to eliminate a stunted yellow perch population which seriously reduced growth and survival of salmonid fishes and interfered with angling for the preferred cold water species.

Four hundred gallons of NOX-FISH (Penick) Rotenone emulsion 5% was applied by boat bailer to approximately 1200 acre-feet of water. Thirty gallons were dripped into Lost Cr. at the mouth of the East Fork Lost Cr. Fifty gallons of ChemFish 2.5% were dripped into Lost Cr. at the lowest culvert on 10 October, and 1 gallon of NOX-FISH was dripped into a small unnamed tributary.

McCall Hatchery personnel dip-netted affected brook trout in Lost Cr. downstream of the drip station and transferred them to the hatchery truck filled with aeriated water and 1 ppm potassium permanganate to detoxify the rotenone. They estimated they captured 1200 brook trout. About 600 survived for release in the Tamarack mill pond. Brook trout predominated the species killed in Lost Cr. Yellow perch, fall chinook, and hatchery rainbows were also present.

In the reservoir, yellow perch made up an estimated 90% of the total fish killed, hatchery rainbows about 5%, brook trout 3%, fall chinook 1% and bullheads, smallmouth bass, and mountain suckers < 1% each. The smallmouth bass were apparently illegally introduced within the past few years. We had no record of their presence prior to the treatment.

One experimentally rigged gillnet was fished October 11-13 and no live fish captured. A complete kill may have been attained, but the treatment would be justified if the perch population is controlled for even three years; five years of control is expected.

Outstanding cooperation was received from the dam tenders and water master.

IDAHO

DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

FEDERAL AID IN FISH RESTORATION

Job Performance Report

Project F-71-R-10



REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

- Job 3(MC)-a. McCall Subregion Mountain Lakes Investigations
- Job 3(MC)-b. McCall Subregion Lowland Lakes and Reservoirs Investigations
- Job 3(MC)-c. McCall Subregion River & Stream Investigations
- Job 3(MC)-d. Region 3 Technical Guidance - McCall
- Job 3(MC)-e. Region 3 Salmon and Steelhead Investigation

by

Don Anderson, Regional Fisheries Manager
Judy Linman, Fish & Wildlife Technician
Judy Hall-Griswold, Fish & Wildlife Technician

March 1987

OBJECTIVES

The management objectives for Lost Valley- Reservoir are to reduce or eliminate yellow perch, improve growth and survival of rainbow and brook trout, and provide an environment for the establishment of naturally reproducing populations of Shasta, Eagle Lake, and McConaughy strains of rainbow trout.

At Horsethief Reservoir the objectives are to estimate fishing effort, harvest, relative species composition, and length frequency distribution during the opening weekend of fishing season and to evaluate performance of differentially marked rainbow trout stocks planted in 1984 and 1985.

At Little Payette Lake objectives are to obtain baseline data on the fish populations and evaluate the need for chemical rehabilitation. This report presents data collected during the 19d5 field season and makes comparisons with data from the 1984 season.

Additionally, we wish to record incidental creel census information obtained by conservation officers that coincides with angler contacts.

TECHNIQUES USED AND FINDINGS

Lost Valley Reservoir

Fishing pressure and angler satisfaction were perceived as low by the fishery manager, the local conservation officer, and the district forest ranger. Numerous complaints regarding the small perch and few trout were received.

The logistics, mechanics, costs, and expected results of chemical eradication were described in local newspaper articles. Public response to the proposed treatment was solicited in those articles and on local radio. Public input was 100% in favor of the chemical eradication of perch and the restocking of rainbow trout.

Numerous contacts were made with officials of the irrigation district, the dam tenders, and the water master. Outstanding cooperation by those individuals facilitated the draining of the reservoir to about 1,200 acre-feet of water by October 9, 1985.

Snorkel surveys of the inlet stream identified the upstream boundary of yellow perch occurrence at the confluence of Lost Creek and East Fork Lost Creek. Walking surveys of smaller inlets and small tributaries to Lost Creek identified only one small unnamed tributary that might be accessible to perch.

Appendix A. Continued.

The amount of rotenone needed to produce a concentration of 2.0 ppm was calculated. The material was ordered and received from Penick Corporation in 30-gallon drums and stored above 0 C at the McCall Hatchery.

On October 9, 1985, freezing weather caused the water temperature to fall to 7 C. Eleven IDFG employees and one Payette National Forest employee applied rotenone from 1100 hours to 1700 hours.

Three hundred gallons of NOX-FISH (Penick) 5% rotenone emulsion was applied by boat bailer to approximately 1,200 acre-feet of water in the reservoir. Also, 110 gallons of CHEM-FISH 2.5% rotenone emulsion was similarly applied. A drip station, positioned on the culvert at the confluence of Lost Creek and East Fork Lost Creek, applied 30 gallons of NOX-FISH 5% rotenone emulsion during an 8-hour period. On October 10, an additional 55 gallons of CHEM-FISH was dripped into Lost Creek, and one gallon of NOX-FISH was dripped into an unnamed tributary.

McCall Hatchery personnel dip-netted affected brook trout in the treated section of Lost Creek and transferred them to a hatchery truck filled with oxygenated water and 1 ppm potassium permanganate to detoxify the rotenone. Of the estimated 1,200 brook trout captured, about 600 survived until released in the Tamarack Mill Pond.

Dead and dying fish began to appear near the shoreline about one hour after the first application of the chemical. Hatchery rainbow trout, fall chinook, and brook trout were the first to be affected. Several hours later, yellow perch, suckers, bullheads, and smallmouth bass also appeared.

Yellow perch comprised an estimated 90% of the total kill in the reservoir; hatchery rainbows, 5%; brook trout, 3%; fall chinook, 1%; bullheads, mountain suckers and smallmouth bass, <1% each. Postmortem examination of the yellow perch showed that most of the fish were sexually mature at 130-180 mm.

Apparently, smallmouth bass were introduced illegally in recent years because we had no previous record of their presence before the treatment. Both adult and juvenile bass were observed, indicating successful reproduction.

One floating gill net, experimentally-rigged, was fished on October 11-13. No live fish were captured; therefore, a complete kill may have been attained. However, the treatment would be justified even if the perch population is controlled for only three years, and at least five years of control is expected.

About 9,000 holdover hatchery rainbows, averaging 1.2 fish per pound, were planted in late April 1986. An additional 16,000 catchable rainbows were planted in June 1986. These fish supported an excellent fishery during the early part of 1986. Differentially marked groups of three rainbow trout strains were planted in July 1986 to provide future harvest and perhaps establishment of naturally reproducing populations.

IDAHO

DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

FEDERAL AID IN FISH RESTORATION

Job Performance Report

Project F-71-R-12



REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

- Job No. 3(MC)-a. McCall Subregion Mountain Lake Investigations
- Job No. 3(MC)-b. McCall Subregion Lowland Lakes and Reservoir Investigations
- Job No. 3(MC)-c. McCall Subregion Rivers and Streams Investigations
- Job No. 3(MC)-d. McCall Subregion Technical Guidance
- Job No. 3(MC)-e. McCall Subregion Salmon and Steelhead Investigations

By

**Richard Scully, Regional Fishery Biologist
Don Anderson, Regional Fishery Manager**

January 1989

Appendix A. Continued.

From May through September 1987, 59,323 hours of fishing effort were expended at Lost Valley Reservoir to catch 25,017 rainbow trout at an average catch rate of 0.45 trout per hour (Table 6).

Table 6. Monthly estimates of fishing effort (F), fish per hour catch rate (C/F), and number of fish caught (C) from May through September 1987 at Lost Valley Reservoir.
*Weighted by monthly effort.

Months	F \pm 80% CLs	C/F \pm 80% CLs	C \pm 80% CLs
May	17,726 \pm 49Z	0.52 \pm 32Z	7,781 \pm 43Z
June	16,851 \pm 15Z	0.53 \pm 65Z	8,424 \pm 45Z
July	12,453 \pm 34Z	0.36 \pm 57Z	4,790 \pm 39Z
August	8,810 \pm 70Z	0.27 \pm 37Z	2,204 \pm 53Z
September	<u>3,483</u>	<u>0.54</u>	<u>1,818</u>
Totals	59,323		25,017
Average		0.45 ^a	

^aWeighted by monthly effort.

LOST VALLEY RESERVOIR RENOVATION

Final Report

On September 26, 1991, 18 IDFG and 5 Payette National Forest personnel treated Lost Valley Reservoir. We applied Roussel-Bio Corp. NoxFish, a 5% rotenone formulation, to 640 acre-feet of water covering 180 surface acres. Three small outboard boats applied 100 gallons of the chemical using garden hoses directed into the prop wash, a Soloy 12E14 helicopter applied 48 gallons from standard crop dusting gear, 8 gallons were dripped into the inlets and 4 gallons were sprayed into seeps and intermittent tributaries using bladder bag sprayers. A total of 160 gallons of chemical was applied to 640 acre-feet of water for a concentration of 0.83 ppm.

The reservoir had been drawn down to 7.9 on the staff guage at the dam. The average depth was 3.5' with much of the reservoir less than 2.5' deep. Aquatic vegetation was abundant creating impenetrable mats. The shallow water and weed mats caused frequent clogging of propellers and running aground on mud flats. Boat application was difficult for a major portion of the reservoir. The draw-down exposed large expanses of mud shoreline making launching and retrieving boats difficult. Some isolated potholes were made inaccessible by thigh-deep mud. The draw-down continued until the day prior to the treatment necessitating frequent recalculation of the volume and "surprises" regarding the bottom contours.

Live perch were reported by observers in boats the following morning. Complete coverage had not been attained where boat and helicopter zones were scheduled to meet. We decided that horizontal dispersion of the chemical would be greatly reduced by the abundant vegetation and that the areas missed the first day would need direct application.

The helicopter applied 80 gallons of TIFA, Inc. ChemFish (a 2 1/2% synergized formulation) to the entire surface of the Lost Valley Reservoir pool and to isolated potholes. This operation took approximately 4 hours of flight time. The 80 gallons of chemical made a concentration of 0.42 ppm for a total application concentration of 1.25 ppm.

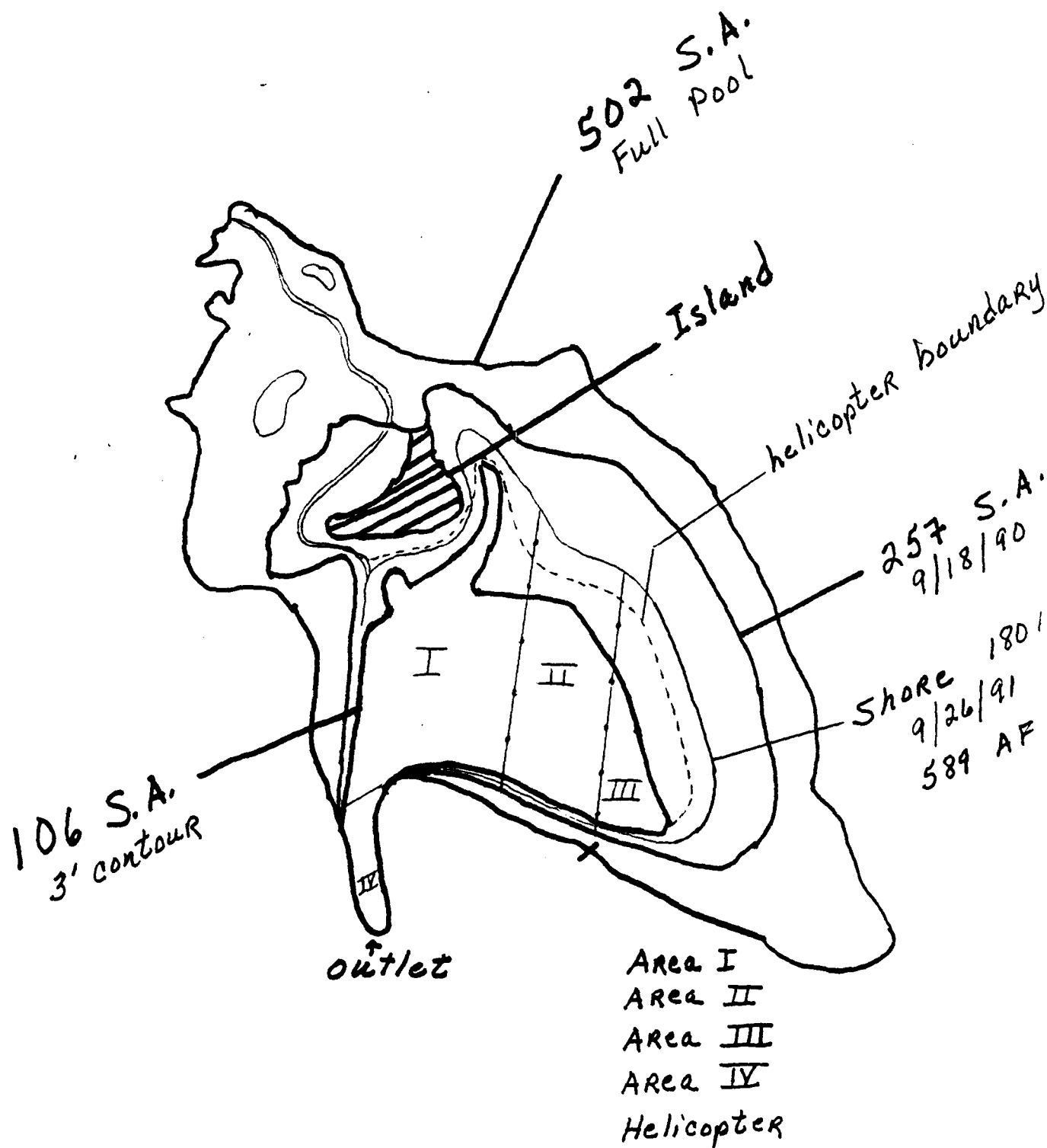
Appendix A. Continued.

Fourteen days after the initial application, observers in boats saw one live, but moribund fish in 2 hours of searching the reservoir pool. Dead fish were seen in all areas of the reservoir indicating that toxic levels had been attained throughout the reservoir. We estimated the pool would remain toxic for 4-5 weeks allowing ample time for mixing. The drip stations at Slaughter Gulch and the East Fork Lost Creek were reactivated treating the inlet on 27 and 28 September. Gillnetting will be done in the spring of 1992 to further evaluate success of the treatment.

Juvenile yellow perch and adult perch averaging 125 mm comprised 99+% of the observed kill. Few dead rainbow trout or brook trout were observed in the reservoir. Brook trout, rainbow trout, and yellow perch, in that order of occurrence, were killed in Lost Creek above the reservoir. Yellow perch, brook trout, rainbow trout, sculpin and suckers, in that order, were killed in Lost Creek below the dam. Trout Unlimited members and PNF personnel salvaged 450 brook trout, 350 rainbow trout and 1 smallmouth bass from Lost Creek below the dam. The fish kill extended 4 1/2 miles below the dam to Bear Gulch.

Future treatments of Lost Valley Reservoir should maximize the use of a helicopter. The helicopter was able to apply rotenone to the entire surface of the pool and to isolated potholes in 4 hours of flight time. It distributed the chemical evenly and without disturbing organic sediment. An observer or trained pilot can readily identify skips in coverage, inlets, seeps, isolated potholes, and even live fish. Helicopter application is not difficult or dangerous being similar to spraying for aphids in a Palouse pea field. A future treatment of Lost Valley Reservoir could be done with the helicopter pilot, his 2-person ground crew, 1 coordinator, 1 drip station operator, 1 hand sprayer, and a gofer. The cost of the helicopter, crew, and ferry time would be approximately \$4,000 in 1991 dollars.

Future treatments of Lost Valley Reservoir should apply rotenone to attain a 1.0 ppm concentration to accommodate the problems with aquatic vegetation. Also, planning should include maintaining a stable minimum pool for at least 5 days prior to the treatment.



JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fisheries Management
Investigations

Project: F-71-R-16

Title: Region 3 (McCall) Lowland Lakes
and Reservoirs Investigations -
Cascade Reservoir Creel Census
and Fish Investigations

Job No.: 3-b² (McCall)

Period Covered: July 1, 1991 to June 30, 1992

ABSTRACT

Cascade Reservoir is a very important fishery to the state of Idaho. Typically more than 390,000 angling hours are spent annually on this reservoir. The primary fish species sought by anglers are yellow perch Perca flavescens, rainbow trout Oncorhynchus mykiss, and landlocked coho salmon O. kisutch. To monitor this fishery, Cascade Reservoir has had angling pressure and fish harvest estimate studies completed on it approximately every 5 years since 1975. In November 1990, a two-year comprehensive creel census study was begun.

Up to 800,000 rainbow trout are stocked in Cascade Reservoir annually. This is a significant burden on Idaho Department of Fish and Game trout hatcheries. Therefore, it is very important that the most cost efficient fish be stocked in the reservoir. In 1990, a study was begun to determine what size and strain of fish would return-to-the-creel best in terms of numbers and weight. All rainbow trout stocked in Cascade Reservoir were marked with either a fin clip, jaw clip, or fluorescent dye. Return-to-the-creel and survival of these fish were monitored by creel census and gill netting.

From December 1990 through November 1991, an estimated 171,905 angler hours were spent on Cascade Reservoir. Monthly estimates ranged from 3,000 to 37,000 angler hours. Shore anglers accounted for 106,053 hours (60%) of the total angling effort, boat anglers 56,029 hours (33%), and ice fishing the remaining 13,823 hours (8%) (December 7, 1990 through April 11, 1991).

An estimated 83,765 fish were caught during the time covered by the creel census. Monthly harvest estimates ranged from 1,400 to 24,350 fish. Shore anglers caught an estimated 50,328 (60%) fish, boat anglers 24,765 (30%) fish, and ice anglers 11,427 (10%) fish.

The average catch rate during the creel survey was 0.48 fish/hour. Ice anglers enjoyed the best catch rate at 0.83 fish/hour. Shore and boat angling had similar success rates with 0.49 and 0.44, respectively.

Return-to-the-creel of marked stocked rainbow trout ranged from 0.11% to 6.45%. The lowest returns were from the fall-stocked Kamloops strain that were 6.5-inch fingerling. These had been in the system for 14 months with only a 0.11% return by number and 0.9% return by weight. To date, the best return was the June stocking of 10-inch Kamloops/steelhead. These had been in the system for 5 months with a 6.5% return by number and 9.7% return by weight. May gill netting surveys were conducted to assess the yellow perch population and stock composition of rainbow trout. The perch population was dominated by age 1+ and 2+ fish. Over one-third of the rainbow were wild fish.

Authors:

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OBJECTIVES

1. To determine changes in angling pressure, success, and fish harvest since the last creel census was completed in 1986.
2. To determine which size of stocked rainbow trout Oncorhynchus mykiss is most cost effective in return-to-the-creel by number and pounds.
3. To examine the yellow perch Perca flavescens population and its current and future status.

INTRODUCTION

Cascade Reservoir is a very important fishery to the state of Idaho. Typically more than 390,000 angling hours are spent annually on this 28,800 acre reservoir. The primary fish species sought by anglers are yellow perch, rainbow trout, and landlocked coho salmon O. kisutch. Angling pressure and fish harvest have been monitored approximately every 5 years since 1975. In November 1990, another comprehensive creel census study was begun.

Cascade Reservoir is a significant burden on the Idaho Department of Fish and Game fish hatcheries. Table 1 illustrates the annual fish stocking strategy for the reservoir. Similar annual stockings have taken place for the last several years. The annual dollar cost to the Idaho Department of Fish and Game is \$55,000 to \$85,000. Therefore, it is imperative that the most cost efficient stocking program be implemented on Cascade Reservoir. In 1990, a study was begun to determine which size of rainbow trout stocked in the reservoir would return to the angler best in numbers and pounds.

Table 1. Rainbow trout and salmon stocking and associated stock markings for Cascade Reservoir in 1990 and 1991.

Mark	Strain	Number	Date	Size
LV	Kamloops	169,000	9/90	6.5" - 10.0/lb
RV	Tasmanian	145,000	5/90	7.0" - 4.7/lb
Ad	Eagle Lake	130,000	10/9	3-8" - 21.5/lb
No mark	Hayspur ¹	265,000	6/90	6.0" - 10.4/lb
No mark	Coho	551,500 ²	6/90	4.0" - 27.6/lb
R. Max.	Kam/Steel	150,000	6/91	10.0" 2.8/lb
No mark	Hayspur ¹	100,000	5/91	4.5" - 30.0/lb
Red dye	Kamloops	139,500	10/9	6.0" - 15.0/lb
Orange dye	Kamloops	145,600	10/9	6.5" - 10.4/lb
Green dye	Kamloops	111,220	10/9	7.0" - 8.3/lb
No mark	Coho ³	126,750	4/91	6.5" - 7.5/lb

¹Hayspur strain rainbow trout were stocked as excess fish and were not marked, other than the typical fin deformities that occur in hatcheries. These fish were not kept separate from wild fish in 1990-91, but will be in 1992.

²Of these, 55,000 were stocked in Lake Fork Creek to try and establish a spawning run for an egg source.

³These fish were privately raised and were in very poor condition when stocked. Only an estimated 20% were considered viable. They were known to be carriers of several diseases.

METHODS

All rainbow trout stocked in Cascade Reservoir since May 1990, with the exception of the Hayspur strain, were marked with either a fin clip, a maxillary clip, or with fluorescent pigment. The Hayspur fish were the only stocked fish present without an actual mark. However, 98% of these fish exhibited the typical dorsal fin deformity that is common in hatchery fish. Therefore, these fish were identifiable by size and lack of true marks, other than the deformed dorsal.

Creel Survey

A random stratified creel census was used to estimate the harvest of marked rainbow trout and determine angling pressure and success. The census was started on Cascade Reservoir in November 1990 and will continue through November 1992. The creel census was structured similarly to the creel completed in 1986 (Anderson et al. 1987). For each month creel that the lake was not ice covered, three weekend days and three weekdays were randomly selected. A count time was randomly selected for each of these days. Counts were made of the total number of shore fishermen and total number of fishing boats. Three hours following the first count, a second count was made (if there were not 3 hours of daylight remaining for the second count, both counts were moved ahead 3 hours).

The lake was divided into two sections, upper and lower, as described by Anderson et al. (1987). Counts on scheduled days were made alternately on either the upper or lower section. Total lake counts were then calculated by dividing the count for that section by the proportion of fishing effort which occurred in them in 1982. The proportion for the upper lake section was 0.28, and 0.72 for the lower section.

During months of ice cover, 13 creel days were randomly selected, 9 of which were weekend days. A count time for each scheduled day was also randomly selected. Only one count per day was made during ice covered months. Weekend day counts were made with the use of fixed-wing aircraft. This made the counts much more instantaneous and accurate. Aerial counts also helped set the strategy for getting angler interviews for that day.

Angler interview data collected included the number of anglers in a party, hours fished, and the number and species of fish harvested. Each rainbow encountered was inspected for a mark. All game fish were weighed and measured. Monthly creel data was input and run on the computer program SERCREEL developed by Christopherson and Janssen (1989).

Gill netting

From May 20 through May 29, 1991, Cascade Reservoir was extensively gill netted. A total of 26 sites were fished to catch marked rainbow trout and yellow perch. All but one of the sets were attached to the shoreline. Eleven of the 26 sets were with 150-ft floating experimental gill nets. The remaining 15 sets were with 150-ft diving experimental nets. Nets were set and fished all night, pulled the next day, then moved to a new location. Each net was in the water an average of 19 hours (9.4 night hours). One net was tampered with, so only 25 nets fished the entire time. Figure 1 shows the exact location of the sets. Total lengths and weights were taken from all trout collected and from a subsample of all other species collected. Scales were taken from five yellow perch at each 5 mm length increment. The scales were later aged and annuli measured. Growth back-calculations were made to determine growth rates.

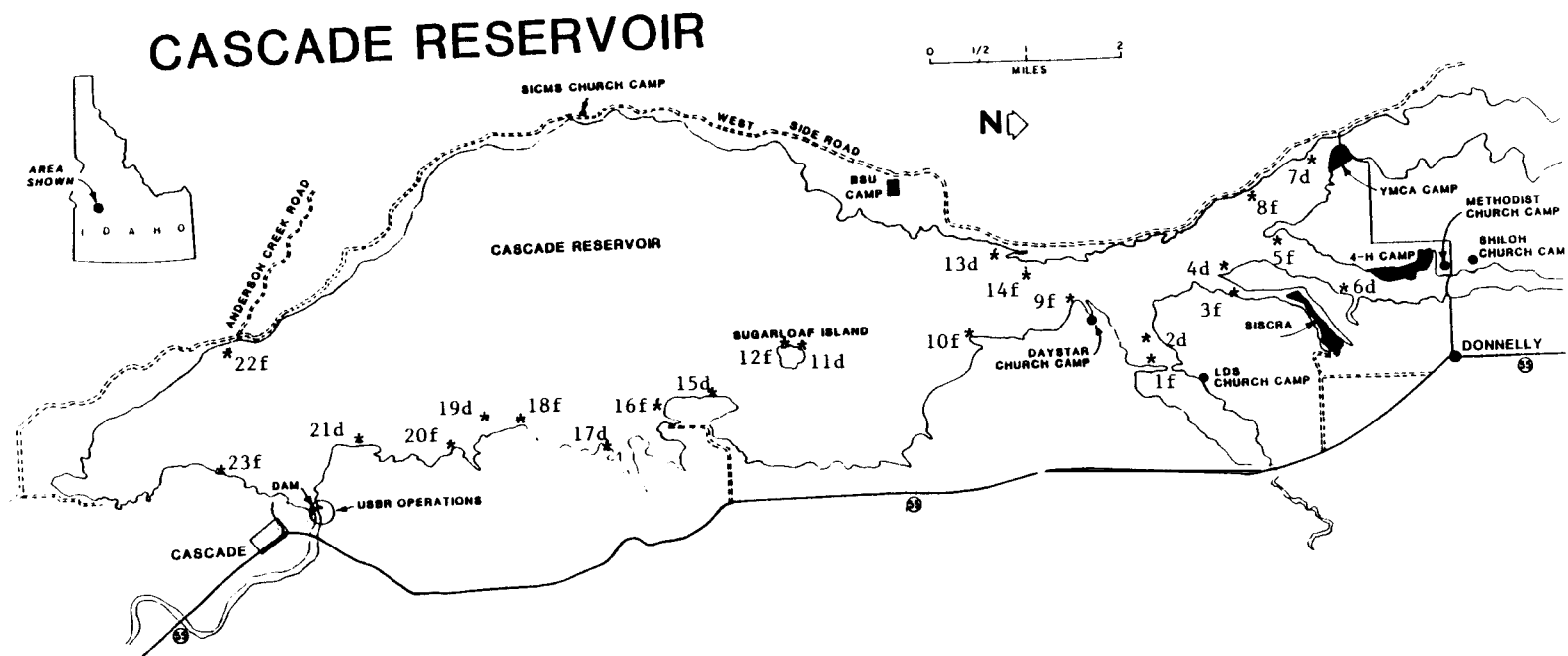


Figure 1. Overnight gill net locations (*) and type (d = diver, f = floater) on Cascade Reservoir, Idaho. Sampled May 20, 1991 through May 29, 1991.

RESULTS

Creel Survey

From December 1990 through November 1991, an estimated 171,905 angler hours (5.8 hours/hectare) were spent on Cascade Reservoir. Monthly estimates ranged from 3,000 to 37,000 angler hours (Table 4). Shore anglers accounted for 106,053 hours (60%) of the total angling effort, boat anglers 56,029 hours (33%), and ice fishing (December 7, 1990 through April 11, 1991) the remaining 13,823 hours (8%).

An estimated 83,765 fish were harvested during the time covered by the creel census. Monthly harvest estimates ranged from 1,400 to 24,350 fish. Shore anglers harvested an estimated 50,328 (60%) fish, boat anglers 24,765 (30%) fish, and ice anglers 11,427 (10%) fish.

The average harvest rate during the creel survey was 0.48 fish/hour. Ice anglers enjoyed the best harvest rate at 0.83 fish/hour. Shore and boat angling had similar success rates with 0.49 fish/hour and 0.44 fish/hour, respectively. Combined monthly harvest rates for yellow perch, coho, and rainbow trout are given in Figure 2. Harvest rates for these three species for boat and shore anglers are given in Table 2.

Table 2. Monthly harvest rates of yellow perch, coho, and rainbow trout by boat and shore anglers, November 1990 through November 1991.

Month	Angler Type	Yellow Perch	Rainbow Trout	Coho
11/90	Boat	0.0	0.048	0.0
	Shore	0.003	0.0	0.008
Ice/90-91	Ice	0.496	0.052	0.127
4/91	Boat	0.0	0.075	0.0
	Shore	0.0	0.328	0.0
5/91	Boat	0.045	0.030	0.015
	Shore	0.0	0.284	0.0
6/91	Boat	0.313	0.086	0.125
	Shore	1.241	0.193	0.010
7/91	Boat	0.157	0.249	0.175
	Shore	0.267	0.227	0.040
8/91	Boat	0.146	0.171	0.048
	Shore	0.247	0.168	0.0
9/91	Boat	0.325	^ 139	J.005
	Shore	0.156	0.077	0.009
10/91	Boat	0.092	0.373	0.040
	Shore	0.107	0.765	0.016
11/91	Boat	0.0	0.0	0.0
	Shore	0.0	0.912	0.0

Of all the fish species caught, yellow perch made up the largest percentage of the overall harvest at 59% or 50,147 fish (Table 5). Rainbow trout were the next most important at 22% or 18,825 fish. Coho were third, at 13% of the total harvest or 10,971 fish. Figure 3 graphically displays the importance of each species of fish in the creel in overall harvest.

Return-to-the-creel of marked stocked rainbow trout ranged from 0.11% to 6.45% (Table 3). The lowest returns were from the fall-stocked 6.5-inch Kamloops strain fingerling. These have been in the system for 14 months with only a 0.11% return by number and 0.9% return by weight. To date, the best return was the stocking of 10-inch Kamloops/steelhead. These had been in the system for 5 months with a 6.46% return by number and 15% return by weight.

Average monthly growth rates are given in Table 3. These figures are imprecise for the left ventricle and adipose-clipped fish, due to the small number of returns seen. Figures 4 and 5 illustrate growth rates and condition factors of the Tasmanian strain and Kamloops/steelhead stockings.

Table 3. Cascade Reservoir marked stocked rainbow trout return results and Growth rates as of November 30, 1991.

Strain	Mark	Size at Stocking (In)	Months in Res.	% Return by Number	% Return by Weight	Average Growth per Month (mm)
Tasmanian	RV	8.0	18.0	0.70	7.00	16.5
Skanes/Kam	LV	6.5	14.0	0.11	0.90	14.9
Eagle Lake	AD	5.0	13.0	0.12	1.96	NA
Kam/Steel	R.Max	10.0	5.5	6.46	15.00	13.7

Gill netting

A total of 478 net hours (234 night hours) were spent to collect a total of 3,105 fish. Of these, 44% (1,360) were yellow perch, 25.5% (795) squawfish Ptychocheilus oregonensis, 20% (632) largescale suckers Catostomus macrocheilus, 7% (207) bullhead Ictalurus melas, 1.7% (54) coho salmon, and 1.3% (40) rainbow trout. The remaining 0.5% of the fish consisted of pumpkinseed Lepomis gibbosus, black crappie Pomoxis nigromaculatus, smallmouth bass Micropterus dolomieu, redeye shiners Richardsonius balteatus, whitefish Prosopium williamsoni, and brook trout Salvelinus fontinalis.

The total weight of the six major fish species collected was 1,490 kg (1.64 tons). Of this, 52% (778 kg) were largescale sucker, 33% (491 kg) squawfish, 9% (130 kg) yellow perch, 3% (51 kg) bullhead, 1.5% (23 kg) coho, and 1.5% (21 kg) rainbow trout.

Of the 40 rainbow trout sampled, 37.5% (15) were wild, 27.5% (11) large unmarked hatchery fish (older than our study group), 20% (8) adipose-clipped, 10% (4) left ventral clipped, and 5% (2) Hayspur strain (less than 12 inches and unmarked).

A total of 318 yellow perch were weighed and measured. The population age structure and weight-length relationships are given in Figures 6 and 7. A total of 32 yellow perch scales were aged and growth back-calculations made. The results are given in Table 6.

Table 4. Total estimated angler hours, harvest rates, and total harvest for Cascade Reservoir, Idaho for April 1986 through May 1987 and December 1990 (winter ice) through November 1991, with 95% confidence intervals.

Month	Type	Angler Hours		Harvest Rates		Total Harvest	
		1986	1991	1986*	1991	1986	1991
June	Boat	30,100± 54%	5,890± 81%	1.5±106%	0.46 ± 88%	45,150±132%	2,300±116%
	Shore	24,800± 67%	11,496± 30%	1.3± 44%	1.3 ±132%	32,240± 64%	22,048± 74%
July	Boat	54,600± 80%	23,234± 30%	1.1± 30%	0.44 ± 72%	60,060± 74%	12,399± 49%
	Shore	19,500± 55%	13,904± 35%	2.1± 58%	0.45 ±112%	40,950± 98%	5,610±102%
August	Boat	58,900± 84%	12,114± 36%	2.7± 24%	0.31 ±135%	159,030± 64%	4,577± 83%
	Shore	10,400± 42%	12,789± 41%	0.8± 47%	0.41 ± 89%	8,320± 36%	5,294± 85%
September	Boat	15,200±116%	8,469± 71%	1.3± 53%	0.50 ±129%	19,760±151%	4,411±109%
	Shore	7,100± 31%	16,406± 57%	1.0± 75%	0.27 ±103%	7,100± 68%	4,372± 82%
October	Boat	9,700± 52%	2,004± 72%	0.6± 53%	0.36 ±113%	5,820± 41%	716±203%
	Shore	9,400± 87%	16,568± 57%	0.4± 75%	0.41 ± 87%	3,760±116%	6,773± 83%
November	Boat	0	50±136%	0	0	0	0
	Shore	3,980± 28%	2,895± 30%	0.4±119%	0.51 ± 49%	1,592±137%	1,456± 46%
Winter	Ice	50,800± 46%	13,823± 91%	1.4± 51%	0.67 ±149%	71,120± 59%	11,427±107%
April	Boat	9,200±128%	411± 85%	0.5	0.075±192%	4,600±159%	29±151%
	Shore	35,000± 61%	18,265± 61%	0.9± 95%	0.16 ± 72%	31,500±141%	2,738± 82%
May	Boat	35,100± 20%	3,857± 47%	4.0± 65%	0.12 ±314%	140,400± 10%	333±326%
	Shore	18,000± 55%	9,730± 27%	4.7± 58%	0.17 ±134%	84,600± 38%	2,037± 83%
Total	Boat	212,800**	56,029		0.44	434,820	24,765
	Shore	128,180	102,053		0.49	210,060	50,328
	Ice	50,800	13,823		0.83	71,120	11,427
Grand Total		391,780	171,905	1.8	0.48	716,000	83,765

* Recalculated from 1986 report data.

** Mathematical error corrected from 1986 report.

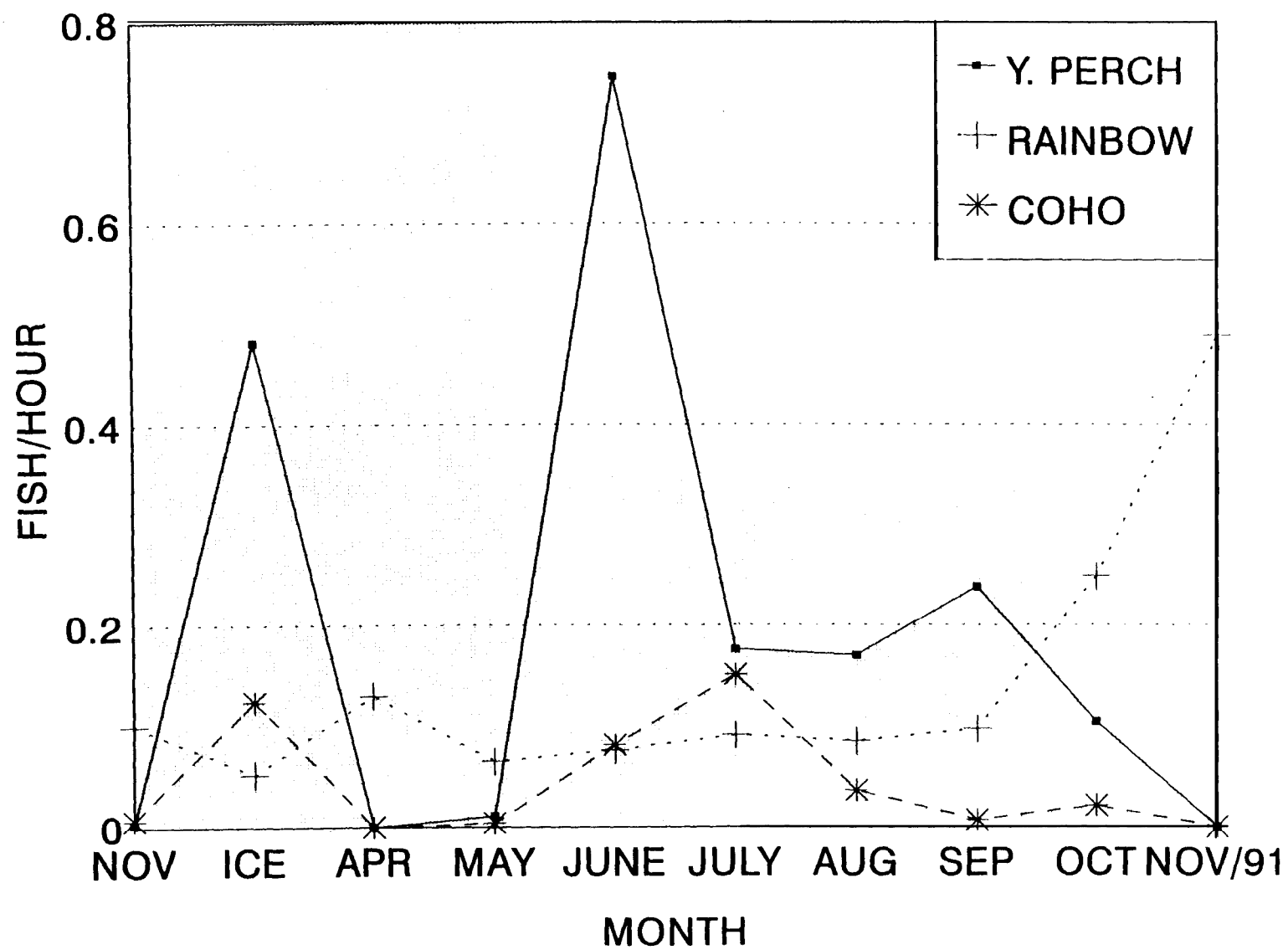


Figure 2. Overall harvest rates of yellow perch, rainbow trout, and coho in Cascade Reservoir in 1991.

Table 5. Estimated fish harvest in 1990/91 by species and month in Cascade Reservoir, Idaho.

Month	Yellow Perch	>18" RBT	RV RBT	LV RBT	AD RBT	<18" RBT ¹	Unseen Trout	Coho	Bull Head	Right Max ²	Small mouth	Green Dye ³	Red Dye	Orange Dye	Squaw fish	Idaho Sucker	Total
11/90	29	1,066	0	0	0	0	0	86	0	0	0				0	0	
12/90 ¹	0	10	0	0	0	0	0	0	0	0	0				0	0	
Ice/90-91	8,515	506	127	63	0	0	32	2,184	0	0	0				0	0	
4/91	0	1,909	273	39	0	78	78	0	117	0	0				39	0	
5/91	165	606	55	0	55	0	165	55	276	0	0				331	662	
6/91	20,365	842	168	0	0	0	0	505	168	0	0				0	0	
7/91	7,333	431	36	36	0	216	431	6,291	899	2,193	0				144	0	
8/91	5,857	163	163	0	0	0	54	1,247	434	1,519	0				434	0	
9/91	5,743	619	0	0	0	56	450	169	0	1,295	56				394	0	
10/91	2,140	578	116	29	87	173	202	434	29	3,528	116	58	0	0	0	0	
11/91	0	73	27	18	18	119	37	0	0	1,163	0	0	0	0	0	0	
Total Est. =	50,147	6,803	965	185	160	642	1449	10,971	1,923	9,698	172	58	0	0	1,342	662	85.177
of Total =	59	8	1	.22	.19	.75	1.7	13	2	11	.20	.07	0	0	1.6	.78	
Return to Date ¹ =	NA	NA	0.7	0.11	0.12	NA	NA	NA	NA	6.46	NA	NA	NA	NA	NA	NA	

¹Includes wild and Hayspur strain fingerling rainbow trout

(Hayspur unmarked other than the usual fin deformities from hatchery life).

²Right maxillary-clipped fish stocked June, 1991.³Dye marked fish were stocked October 1, 1991.⁴December 1, 1990 through December 6, 1990.⁵Percent of return-to-the-creel of marked/stocked rainbow trout.

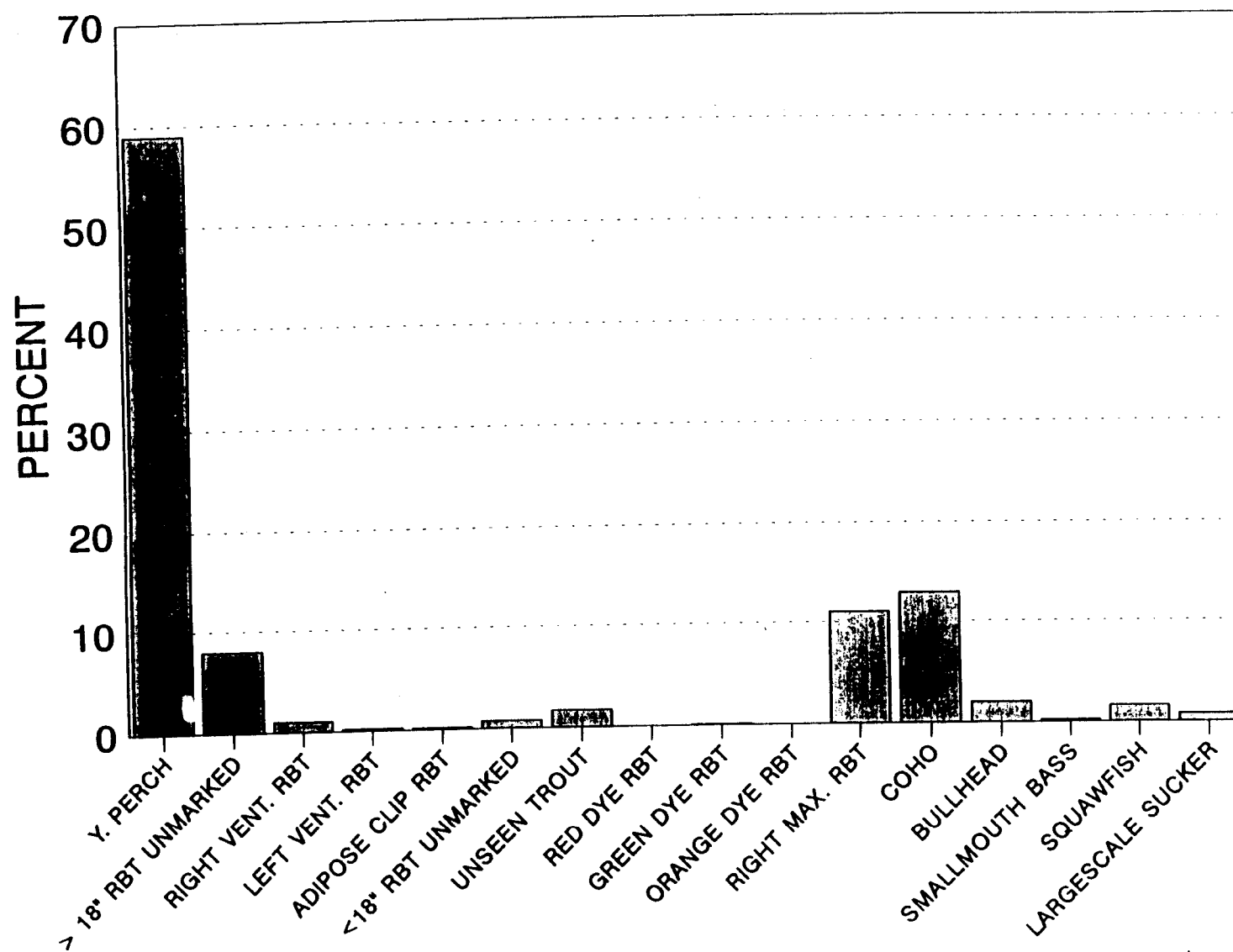


Figure 3. Percent incidence of each species of fish in the 1991 creel census on Cascade Reservoir, from November 1990 to November 1991.

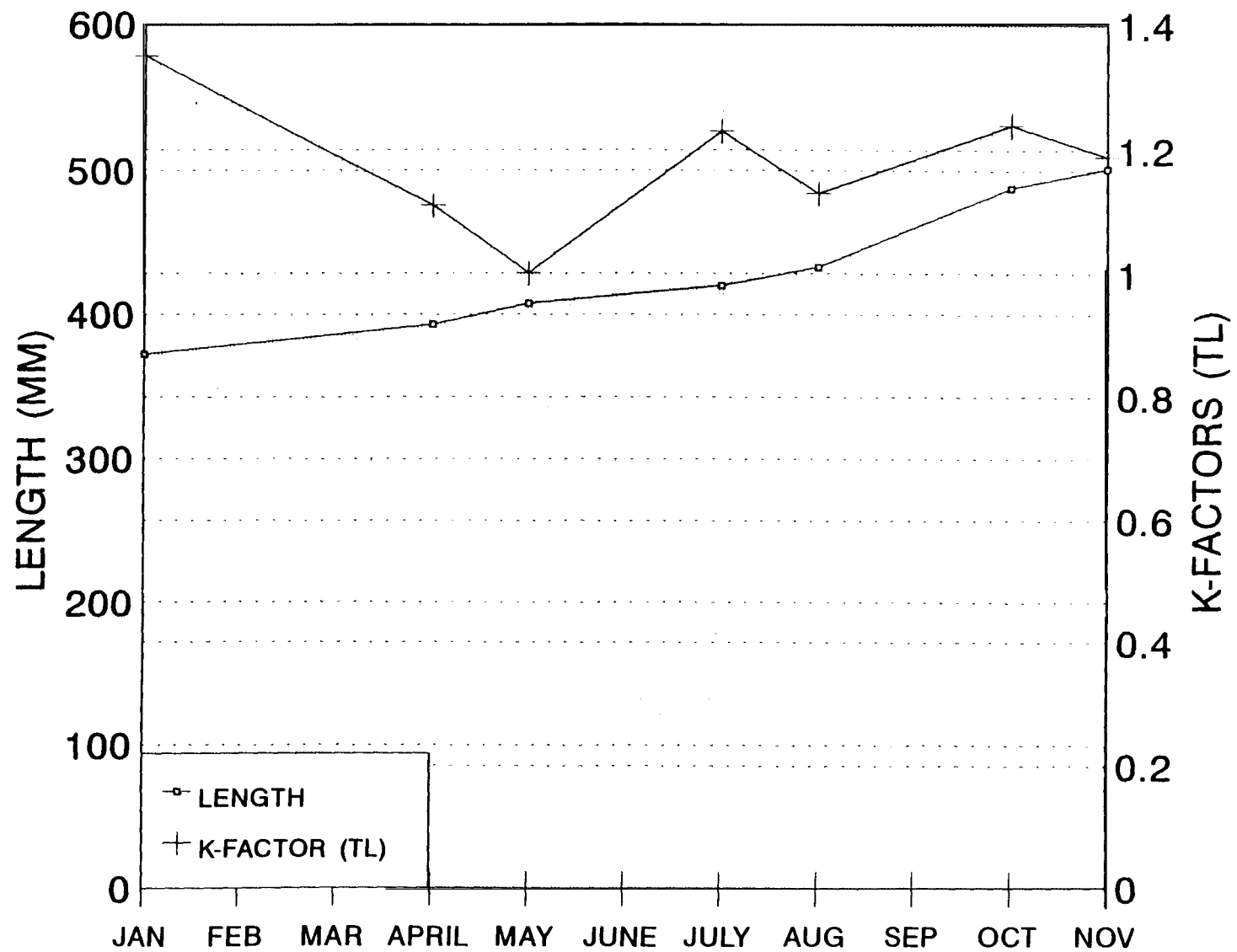


Figure 4. Growth and condition of left ventral fin clipped rainbow trout in Cascade Reservoir, 1991.

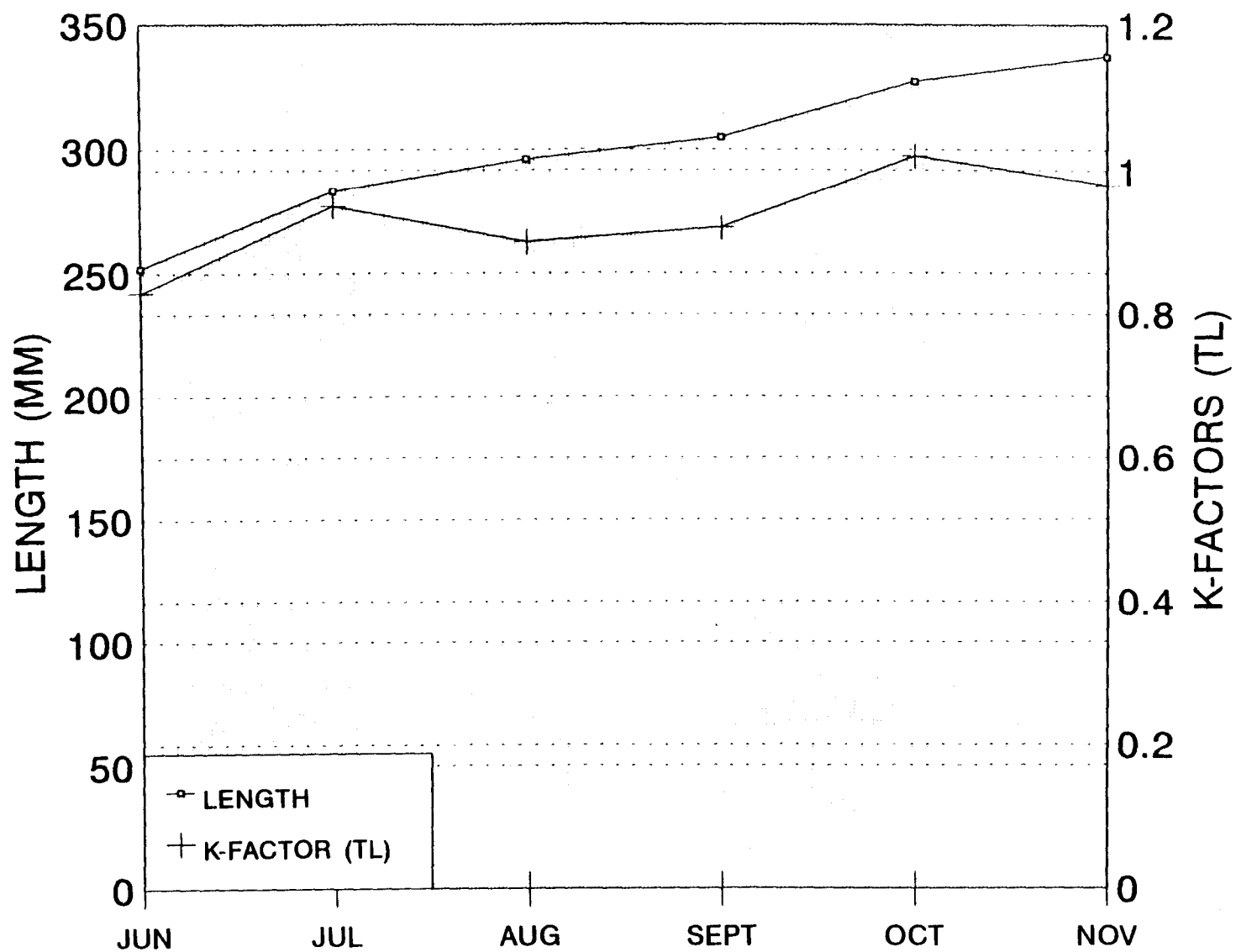


Figure 5. Growth and condition of right maxillary clipped rainbow trout in Cascade Reservoir, 1991.

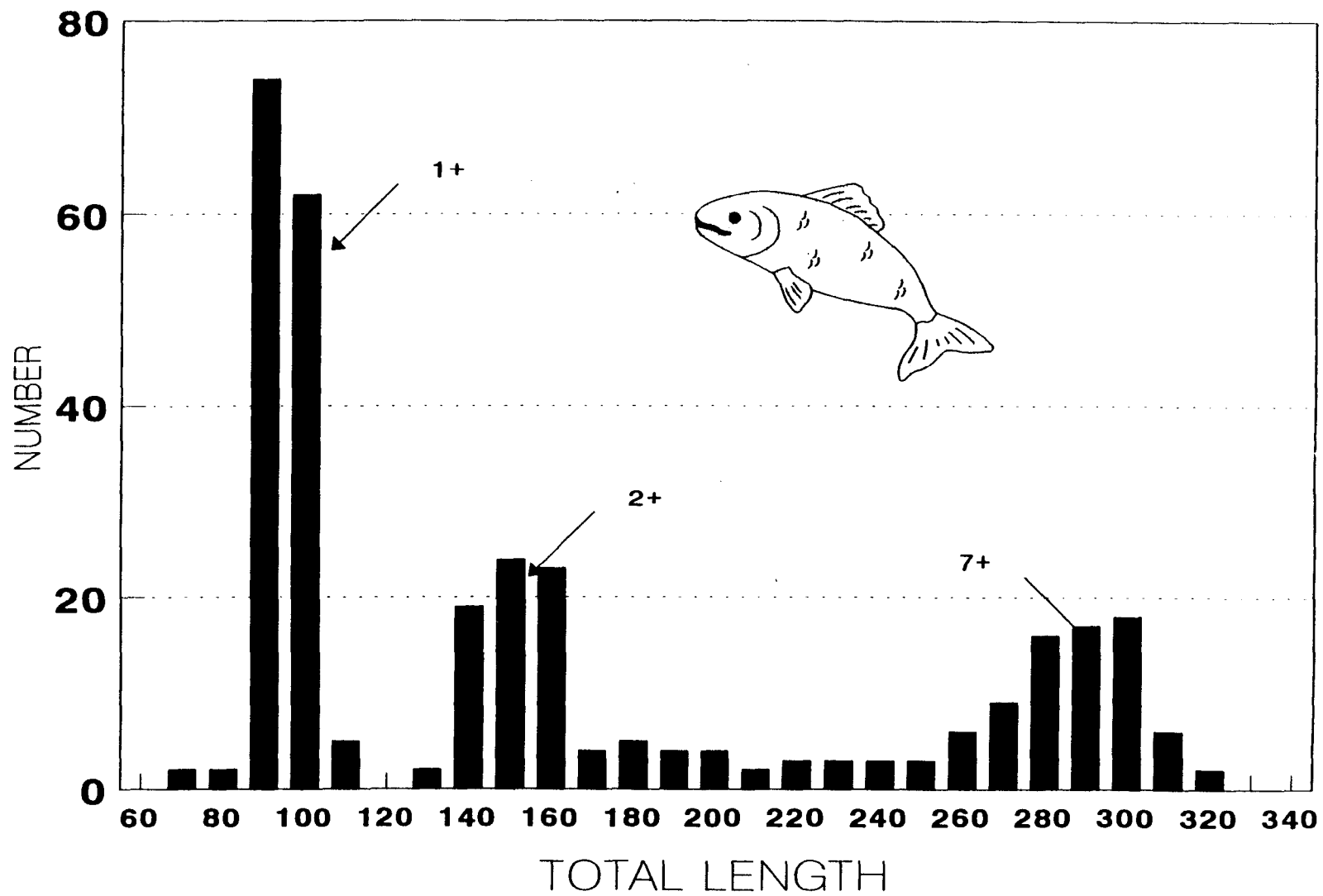


Figure 6. Cascade Reservoir yellow perch length frequencies, May 1991.

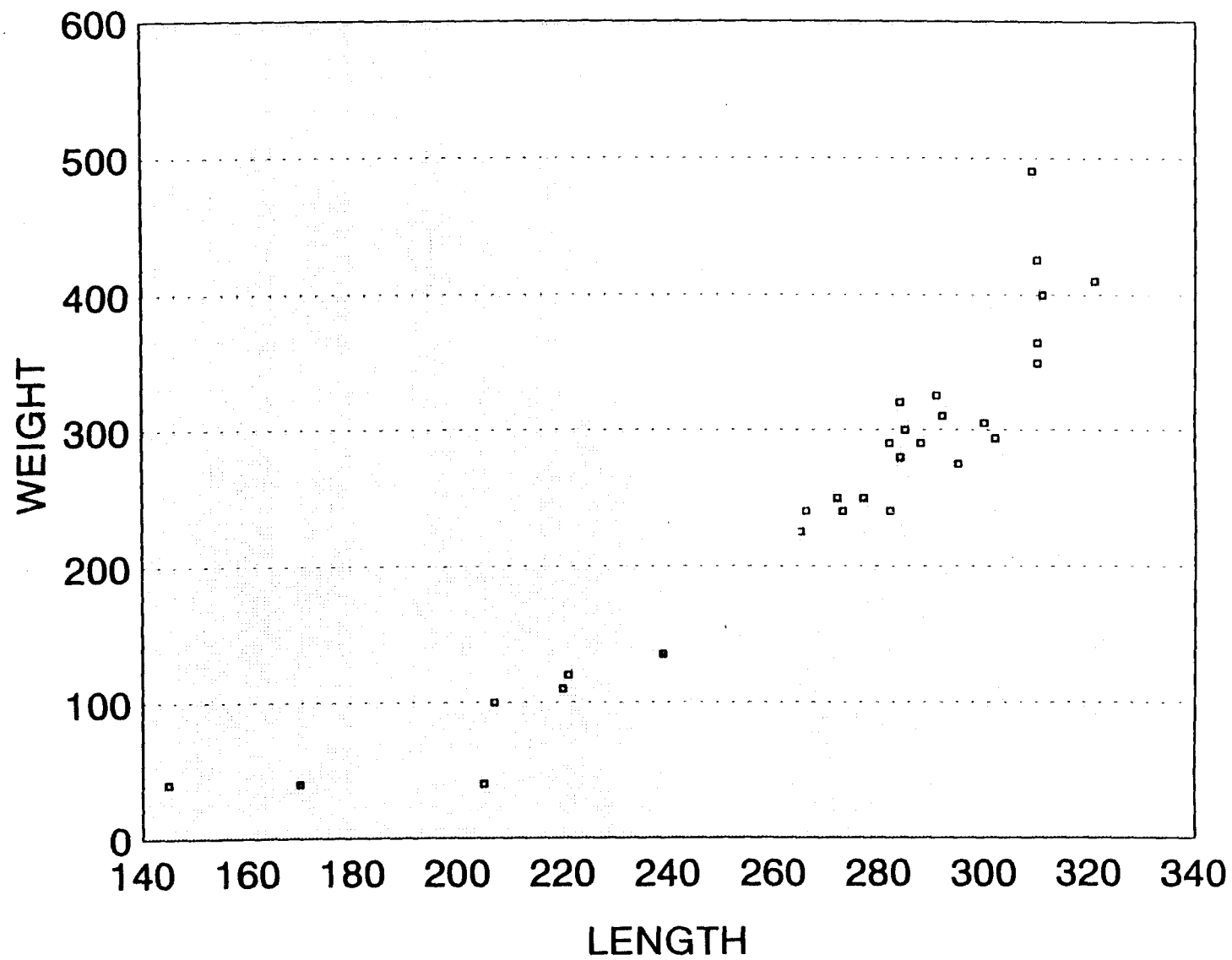


Figure 7. Length-weight relationship of yellow perch in Cascade Reservoir in May 1991.

Table 6. Back-calculated lengths (mm) for each age class of yellow perch collected with gill nets in May 1991 in Cascade Reservoir.

Year Class	Age	N	Back-calculated age						
			1	2	3	4	5	6	7
1990	1	3	76						
1989	2	4	52	155					
1988	3	7	64	132	188				
1987	4	1	43	126	199	221			
1986	5	1	70	121	190	220	249		
1985	6	5	65	129	189	224	249	272	
1984	7	11	72	131	187	223	248	268	290
All Classes			66	134	188	223	249	269	290
N		32	32	29	25	18	17	16	11

DISCUSSION

There were dramatic changes in the Cascade Reservoir fishery from 1986 to 1991. Total effort dropped 56% in 1991 from the 1986 estimate. This is no doubt explained by the 70% drop in harvest rates in 1991 from 1986. Estimated yellow perch harvest rates dropped from 1.35 to 0.29 fish per hour and harvest dropped from 528,150 fish to 50,147. The estimated hatchery rainbow trout harvest dropped from 54,650 fish to 8,470. Harvest rates dropped from 0.14 to 0.05 fish per hour, and reasons for the drop in catch rates are two fold - a down cycle in the perch fishery and the lack of survival of rainbow trout stocked in the reservoir at less than four per pound.

There is an obvious trend between numbers of large rainbow trout stocked and the following year's fishing success. In 1985, 400,000 rainbow trout more than 8.4/lb were stocked in the reservoir. In 1990, 145,000 rainbow trout more than 8.4/lb were stocked. However, the ability to determine which size of fish stocked will provide the greatest return has been greatly diminished due to the use of several different strains of fish in this study. The difference in strain performances in given situations is well documented. From this study it is virtually impossible to tell what size a certain strain of fish needs to be to provide a fishery in Cascade Reservoir.

Preliminary results show that the stocking of 10-inch rainbow trout is far more efficient than are the 5- to 8-inch spring or fall stockings. To date, the 10-inch fish have returned to the creel 9.2 times better than the most successful fingerling plant.

By number, the cost of each rainbow trout strain fingerling planted in 1990 (@ \$.018/inch, Tom Frew, Hagerman State Fish Hatchery, personal communication) that returned to the creel was: Skanes/Kamloops = \$16.90, Tasmanian = \$13.44, and Eagle Lake = \$24.50. The cost of each 10-inch rainbow that returned was \$2.80. These costs will improve next year as more of these fish return to the creel.

Since relatively few of the 1990 fingerling returned to the creel in 1991, it is expected that very few of these fish will show up in 1992. The 1991 10-inch put-and-grow fish performed well into late 1991, and it is expected that these fish will continue to return well, late into 1992. Therefore the only real expected improvement in the cost of the various sizes tested is with the 10-inch put-and-grow fish.

Yellow perch fishing should be excellent for 8- to 10-inch fish, beginning in the summer of 1993. The perch population has been dominated the last 5 years by two large age classes (age 7+ and 8+). These fish have now declined enough in numbers to allow for two new and very strong age classes (ages 1+ and 2+). These two age classes should dominate the system for approximately another 5 years, when the cycle should start again.

A more complete analysis and discussion will be made after the completion of the creel census in November 1992.

RECOMMENDATIONS

1. Continue with scheduled creel census through November 1992.
2. Mark two different strains of catchable trout to evaluate return-to-the creel. These should be Kamloops and Hayspur strains, which are planned to be the mainstay of future rainbow trout Oncorhynchus mykiss stockings in Idaho.
3. Determine what reservoir volume is needed to maintain coldwater fish species during summer stratification.
4. Plant 300,000, 8- to 10-inch rainbow trout and 500,000 4- to 5-inch coho annually.
5. Investigate means to increase natural production of rainbow trout recruited to Cascade Reservoir.

LITERATURE CITED

Anderson, D.R., D. Scully, J. Hall-Griswold, and B. Arnsberg. 1987. Federal Aid in Fish Restoration. Regional Fisheries Management Investigations. Job Performance Report. Project F-71-R-11. Idaho Department of Fish and Game, Boise.

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fisheries Management
Investigations

Project: F-71-R-16

Title: Region 3 (McCall) Rivers and
Streams Investigations

Job No.: 3-c (McCall)

Period Covered: July 1, 1991 to June 30, 1992

ABSTRACT

North Fork Payette River

The spawning run of kokanee Oncorhynchus nerka kennerlyi from Payette Lake has been monitored since 1988 to assess spawning escapement and to serve as a method of validating kokanee population/density estimates and survival estimates from trawling.

The entire spawning run in the North Fork Payette River was visually counted on three separate occasions. The total run estimate by the shore count method, above and below the trap, was around 20,800 fish.

A spawner escapement trap was operated on the North Fork Payette River to enumerate the number of adults and to help calibrate our visual counts. Shoreline counts and the expanded estimate of live and dead fish above the weir were compared to known numbers passed upstream to provide a correction factor of 0.893. When applied to the shore count estimate, the corrected total run size estimate would be 18,304 kokanee.

Lake Fork and Canals

Lake Fork and its canals were snorkeled three times through the summer. This was done to explore the extent of fish migration out of Little Payette Lake by smallmouth bass Micropterus dolomieu and rainbow trout O. mykiss. Also examined was the extent of entrainment of the spawning run of Cascade Reservoir rainbow trout and their offspring in the canal system and in sections of Lake Fork that can be dewatered.

Approximately 100 Pennask strain rainbow trout spawners which had been stocked in Little Payette Lake were found directly below the dam. Smallmouth bass, also stocked in Little Payette Lake, were found throughout the creek and canal system. The largest concentration of fish found was in Lake Fork below the first diversion. Here, 529 rainbow trout were counted, of which 1 was a mature Pennask strain rainbow from Little Payette Lake. The remainder were juveniles resulting from reproduction below Little Payette Lake dam. Also, 193 smallmouth bass were counted. There were several age classes of both species present. Trout were found in all of the sections of river and canal snorkeled. No obvious Cascade Reservoir spawners were seen in the system, but have been observed in the past during April and May.

It is apparent that there is spawning and some survival of offspring in the system. However, these fish are trapped in canals and behind diversion dams.

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OBJECTIVES

To maintain information for fishery management activities and decisions for rivers and streams.

INTRODUCTION

North Fork Payette River

The North Fork Payette River above Payette Lake provides the only suitable spawning area for kokanee *Oncorhynchus nerka kennerlyi* in the lake system, and this reach extends only as far as Fisher Creek (Grunder et al. 1990). The spawning run of kokanee has been monitored since 1988 to assess spawning escapement and to serve as a method of validating kokanee population/density estimates and survival estimates from trawling.

Lake Fork and Canals

Two problems exist in Lake Fork and its canal system from the Little Payette Lake dam down to the Highway 55 bridge: 1) There was concern that fish stocked in Little Payette Lake were emigrating into Lake Fork; and 2) Rainbow trout *O. mykiss* from Cascade Reservoir move into this stretch of creek to spawn. Significant and potential recruitment to the reservoir may be lost to the irrigation canal system. From the dam down to the highway there are three major diversions which are capable of, and do, take all water out of the stream in the summer months. Preliminary information was needed to determine the extent of fish entrainment in the system. This would be used to determine the need for further study.

METHODS

North Fork Payette River

The entire spawning run in the North Fork Payette River was physically trapped with a weir. All fish trapped were sexed, counted, and then released upstream. Several green females were sacrificed to obtain fecundity information. The eggs were removed and individually teased out and counted.

In addition to trapping, spawners were counted on three different dates throughout the run by walking the stream and visually counting individual fish. Totals were kept separate for above and below the weir. All live and dead fish were counted separately. A total spawner estimate was made by doubling the largest daily count of live and dead fish.

Otoliths were taken from a small sample of dead fish to verify that the age structure of the run had not changed from previous years.

Lake Fork and Canals

Different sections of the stream and canal were floated with snorkel gear on three different dates. All fish encountered were identified by species and size and counted. Large mature rainbow trout were visually identified further as to strain (Pennask and other). Pennask were separated from other rainbow trout by their unique body shape, spotting pattern, and fin clips. They are long

and slender with rainbow trout coloring and cutthroat trout *O. clarki* spotting patterns (spots concentrated posteriorly and few or no spots anterior to the dorsal fin). Personal communications with fishery biologists in British Columbia, where the Pennask is native, confirmed the unique shape, color, and spotting patterns of these fish. The areas floated are described in the results.

RESULTS

North Fork Payette River

The kokanee spawning run began on August 24, 1991 and ran through mid-October. Fish actually moved through the weir from August 24 through September 30, 1991. A total of 7,543 fish were counted and released over the weir. Some additional fish (500 estimated) moved through the weir when an occasional hole would be dug under the weir from fish crowding against the downstream side. The exact chronology of the movement of fish through the weir is given in Figures 1 and 2. The run consisted of 48% males and 52% females.

Spawning fish shore count totals, obtained by calking the stream, are given in Table 1. The peak count came on September 5, when 10,400 fish were counted in the entire river.

The peak count for fish above the weir came on September 12, 1991. The total spawner estimate for 1991 above the trap, by the shoreline count method, was 9,020 fish (greatest shoreline count doubled). This compares to an actual count of 8,043 (includes an estimated 500 fish that got through the weir) fish released above the trap. On September 12, 1991, when 4,510 total fish were counted by shoreline count above the trap, 6,427 fish had actually been released over the weir. The total run estimate by the shore count method, above and below the trap, was 20,800 fish. This was similar in size to the 1990 run (Table 1). In 1991, shoreline count estimates were 12% higher than the actual count, suggesting a correction factor of 0.893. Therefore, the adjusted run estimate would be 18,304 fish.

Table 1. Shoreline counts of spawning kokanee above and below the weir trap in the North Fork Payette River above Payette Lake in September 1991, and estimates of total run size from 1988 through 1991.

Date	Above Weir		Below Weir		Total	Run Estimate
	Live	Dead	Live	Dead		
9/05/91	982	3	9,402	13	10,400	20,800
9/12/91	4,407	103	---	---	4,510	
10/02/91	1,851	1,470	1,182	3,383	7,886	
1988					13,200	26,400
1989					8,400	16,800
1990					9,600	19,200

Fecundity of all females sampled averaged 769 eggs. Figure 3 illustrates the relationship of total length and number of eggs for kokanee in Payette Lake.

The average fork length of male spawners was 343±3.9 mm, compared with 339±4.0 mm for females (Figure 4). Fork lengths of fresh fish with uneroded tails averaged 21.6 mm shorter than total lengths. The average weight of males and females was 528±17 g and 481±16 g, respectively.

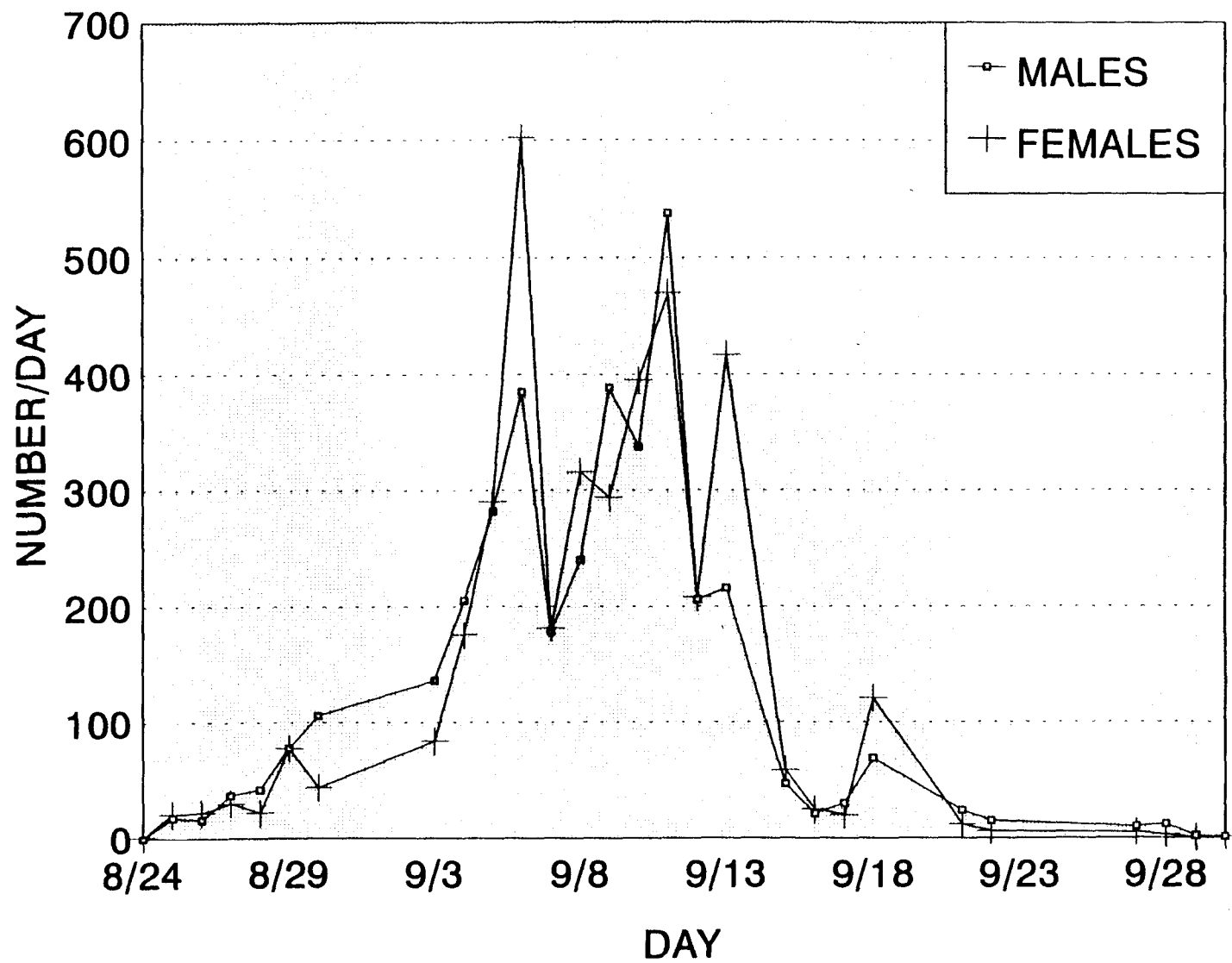


Figure 1. Daily escapement, by sex, of Payette Lake spawning kokanee caught in weir on North Fork Payette River, September 1991.

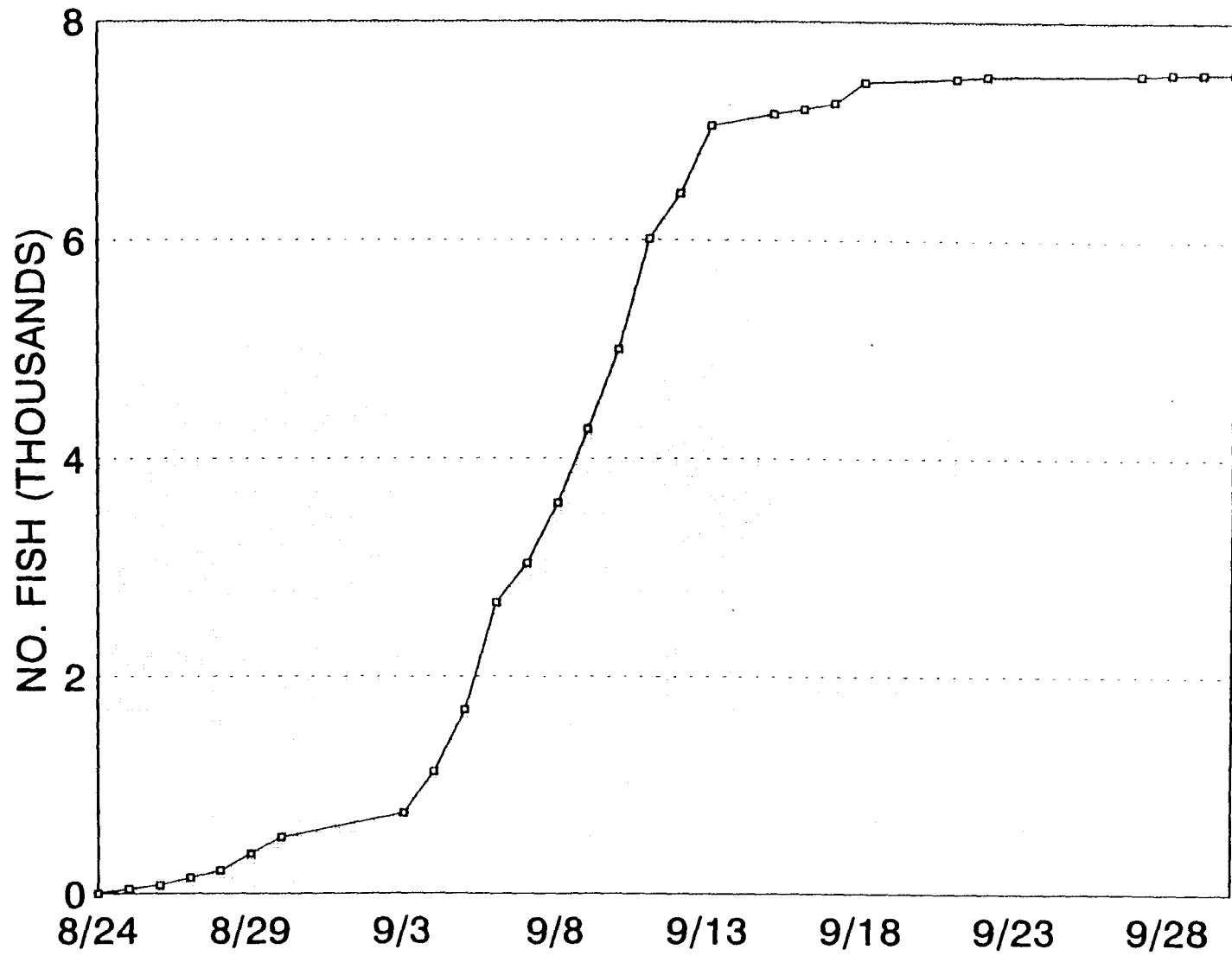


Figure 2. Cumulative escapement of Payette Lake kokanee spawners caught in weir on North Fork Payette River, September 1991.

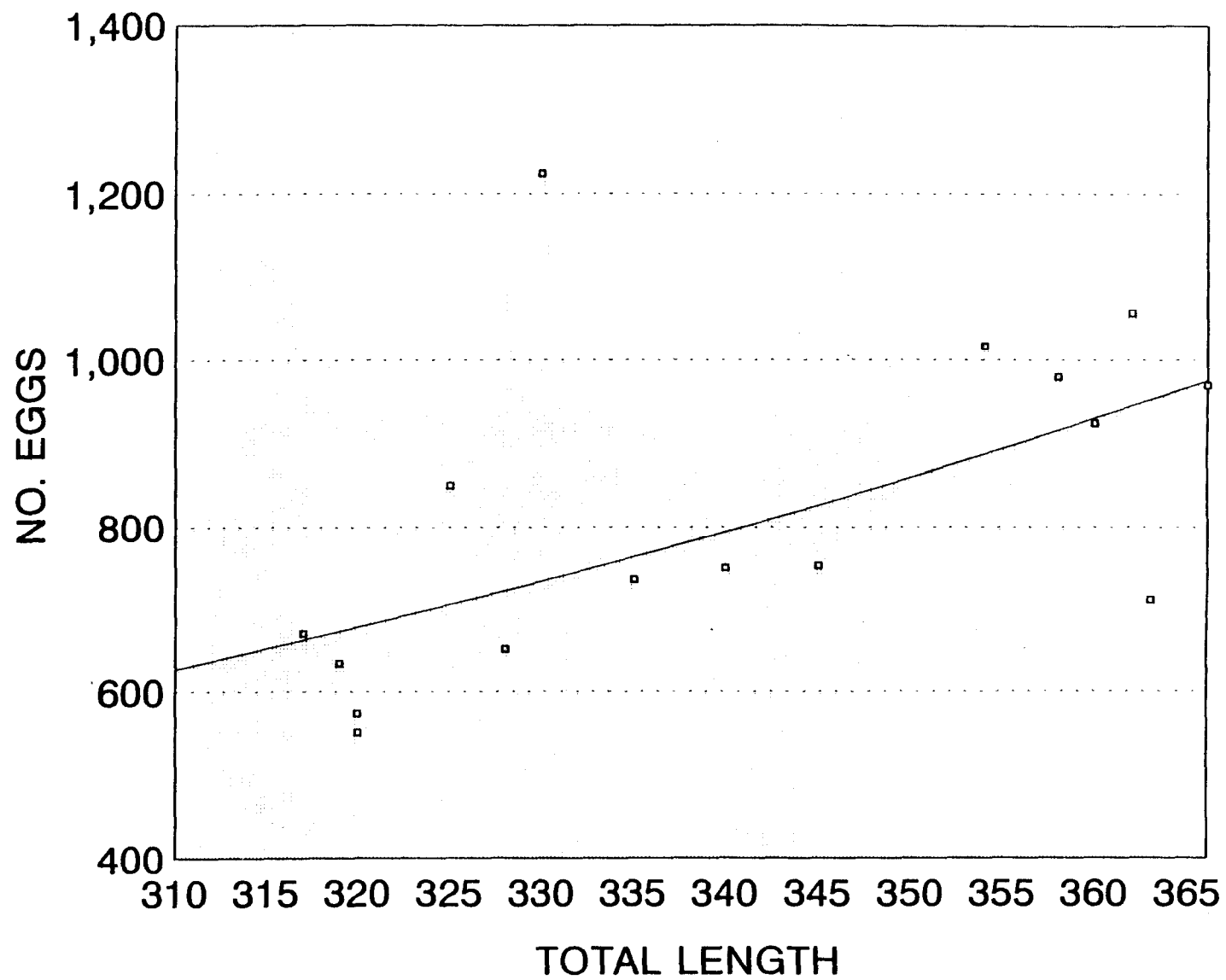


Figure 3. Relationship of total lengths to fecundity of Payette Lake kokanee spawners in North Fork Payette River, September 1991.

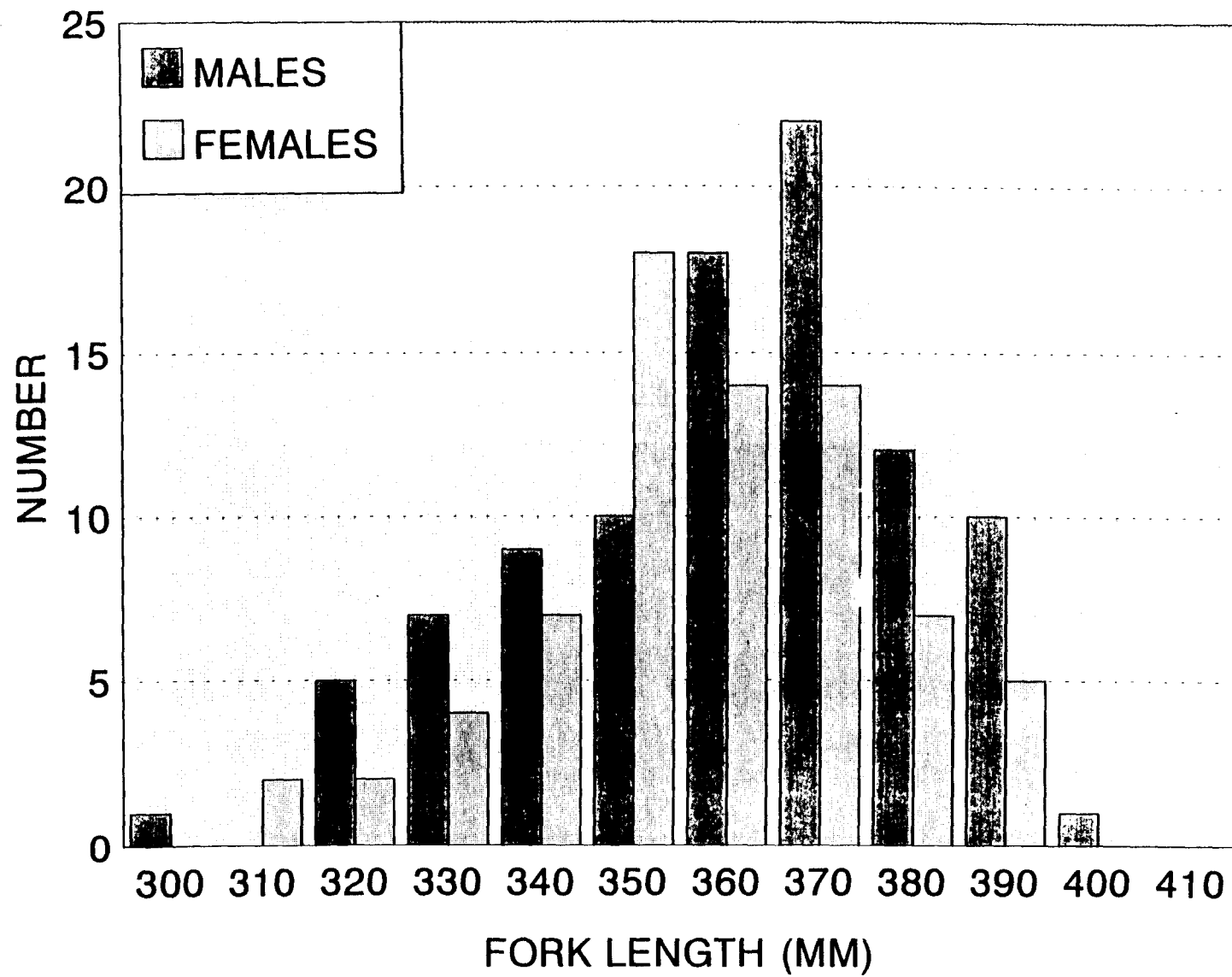


Figure 4. Length frequencies, by sex, of Payette Lake kokanee spawners in North Fork Payette River, September 1991.

Total biomass of the 1991 spawning run, assuming a run size of 18,304 fish, was 9,221 kg. This equals 5.4 kg/hectare of adult fish in Payette Lake (1,715 hectare) prior to the run.

The average age of spawning kokanee was 3+. This was the same as last year.

Lake Fork and Canals

Approximately 100 Pennask strain rainbow trout were seen immediately below the Little Payette Lake dam on June 28, 1991 (Table 2). All of these fish were spawned out adults ranging from 16 to 20 inches in length. It was apparent that there had been a spawning run of Pennask strain rainbows from Little Payette Lake. The magnitude of this spawning emigration below the dam is comparable to that estimated in Lake Fork Creek above the lake. In addition, approximately 50 adult smallmouth bass *Micropterus dolomieu* were found directly below the Little Payette Lake dam. Once out of the direct vicinity of the dam, fish densities dropped. However, many fish were seen in the other sections of the river and diversion canals (Table 2).

No obvious rainbow trout spawners from Cascade Reservoir were seen in the snorkeled sections. These fish would have been quite large (more than 20 inches). Future surveys for Cascade Reservoir-origin spawners should be conducted in mid to late May.

Table 2. Numbers of fish seen while floating with snorkeling gear in different sections of Lake Fork and its canals in June, July, and August 1991.

Date	Section ¹⁻⁵	PEN AD	AD	KAM FRY	RBT FING	RBT 10-12	SMB AD	SMB FING	SMB FRY	SMB ?	WF	BRK	YELLOW PERCH
6/28	1	100					50						
7/3	2	14			2					26			
7/3	3				31	2						8	
7/3	4	1	1		38		4						
8/7	1	7		5	32		26	1	18		9		
8/7	2	5		500		35	20	1			2		
8/7	3	1		58	529		9	4	180		18	2	
8/8	4	1	1		148						11	13	
8/8	5				70			1			2	110	35

¹Little Payette Lake dam to first diversion dam

²First diversion canal, from dam to where it crosses Elo road.

³Lake Fork, first diversion dam down to subdivision on north side of Elo road.

⁴Second diversion ditch, from dam to Highway 55.

⁵Lake Fork from Lake Fork road to Highway 55.

DISCUSSION

North Fork Payette River

It appeared that the trap interrupted the normal upstream migration of fish in the North Fork Payette River. Fish densities were much higher beginning just below the weir.

The average size of spawners has increased dramatically since 1980. The average total length of spawners in 1980 was 259 mm, compared to 363 mm in 1991, an increase of 40%. The reasons for this change are unknown; however, it is clear that the system can support a much larger population of kokanee. Work should be begun to look at spawning success to determine if natural recruitment of juveniles to the lake can be increased, and by how much.

The calibration of spawner counts by actual weir counts was probably accurate for areas above the weir. However, fish densities were greatly increased below the weir, which is where we really needed the calibration. The room for error is obviously much greater in the high density areas. Therefore we cannot predict the degree of accuracy in such areas.

Lake Fork and Canals

A significant number of fish are stranded in the creek and canals below Little Payette Lake dam. Considerable natural reproduction of game fish was documented. Many rainbow trout fry were found in the first diversion canal. Trout fry were observed in August, a month after the first count. Smallmouth bass are spawning successfully in the creek in the sections directly above and below the first diversion ditch. The number of adult trout from Cascade Reservoir and their progeny lost in the system is still unknown. More work is needed to estimate exact numbers of fish present in the system.

RECOMMENDATIONS

1. Continue to count kokanee Oncorhynchus nerka kennerlyi spawner escapement in conjunction with the Payette Lake kokanee population trawling estimates.
2. Trap spawning kokanee from Payette Lake to calibrate kokanee spawner counts and to help determine spawning success. Move trap location to minimize interruption of spawning run.
3. Pursue study of kokanee spawning success in the North Fork Payette River with a university graduate student.
4. Make some quantitative measurements of the number of trout and smallmouth bass Micropterus dolomieu that are lost in the Lake Fork canal system.

LITERATURE CITED

Grunder, S.A., J.D. Linman, and D.R. Anderson. 1990. Federal Aid in Fish Restoration. Regional Fisheries Management Investigations. Job Performance Report, Project F-71-R-15. Idaho Department of Fish and Game, Boise.

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fisheries Management
Investigations

Project: F-71-R-16

Title: Region 3 (McCall) Technical
Guidance

Job No.: 3-d (McCall)

Period Covered: July 1, 1991 - June 30, 1991

ABSTRACT

McCall Subregion fishery management personnel responded to 225 requests and opportunities for technical input. Comments were provided to state and federal agencies on proposed activities for which they have regulatory authority. Advice and technical assistance were provided for private businesses and the public on activities associated with fish, or having impacts on fish populations or fish habitat. The major topics of involvement included stream channel alterations, mining, and land management planning.

We also gave presentations to schools, sportsperson groups, and civic organizations. We answered many questions from the angling public on fishing opportunities, regulations, techniques, and specific waters.

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OBJECTIVES

1. To protect or minimize impacts to McCall area fisheries by providing technical fisheries input to government agencies with regulatory or land management authority.
2. To provide technical fisheries input, guidance, and advice to private entities and the general public.
3. To promote understanding of the environmental requirements of fish populations and appreciation of their values.

RESULTS

Table 1 lists the public and private entities and number of contracts and responses made for each during 1991.

Table 1. Summary of technical guidance responses and activities by McCall Subregion fisheries management personnel in 1990.

<u>Agency or individuals</u>	<u>Number of responses</u>
U.S. Army Corps of Engineers	3
U.S. Bureau of Land Management	3
U.S. Bureau of Reclamation	7
U.S. Environmental Protection Agency	3
U.S. Fish & Wildlife Service	4
U.S. Forest Service	38
U.S. Soil Conservation Service	10
Idaho Department of Health and Welfare	11
Idaho Department of Lands	18
Idaho Department of Parks and Recreation	3
Idaho Department of Transportation	1
Idaho Department of Water Resources	15
Idaho Outfitters & Guides Board	16
County Commissions	5
Health Districts	1
Hydroelectric developers	6
LeBois Resort developers	14
Little Salmon River spill contacts	4
Mining	8
Municipalities	8
National Marine Fisheries Service	6
Nez Perce Tribe	5
Private fish pond owners	20
Public meetings and presentations	13
Total	236

RECOMMENDATIONS

1. Continue to provide technical fisheries input to the entities which most affect fish populations.
2. Continue to provide technical guidance and advice to private interests and the general public.
3. Expand efforts to educate public to environmental requirements for fish.

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fisheries
Management Investigations

Project: F-71-R-16

Title: Region 3 (McCall) Salmon and
Steelhead Investigations

Job No.: 3-e (McCall)

Period Covered: July 1, 1991 to June 30, 1992

ABSTRACT

Region 3 (McCall) salmon and steelhead investigations data are incorporated in a separate statewide "Salmon and Steelhead Investigations" report.

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